

A

PROSPECTUS

OF

THE SCHOOL OF POST GRADUATE STUDIES

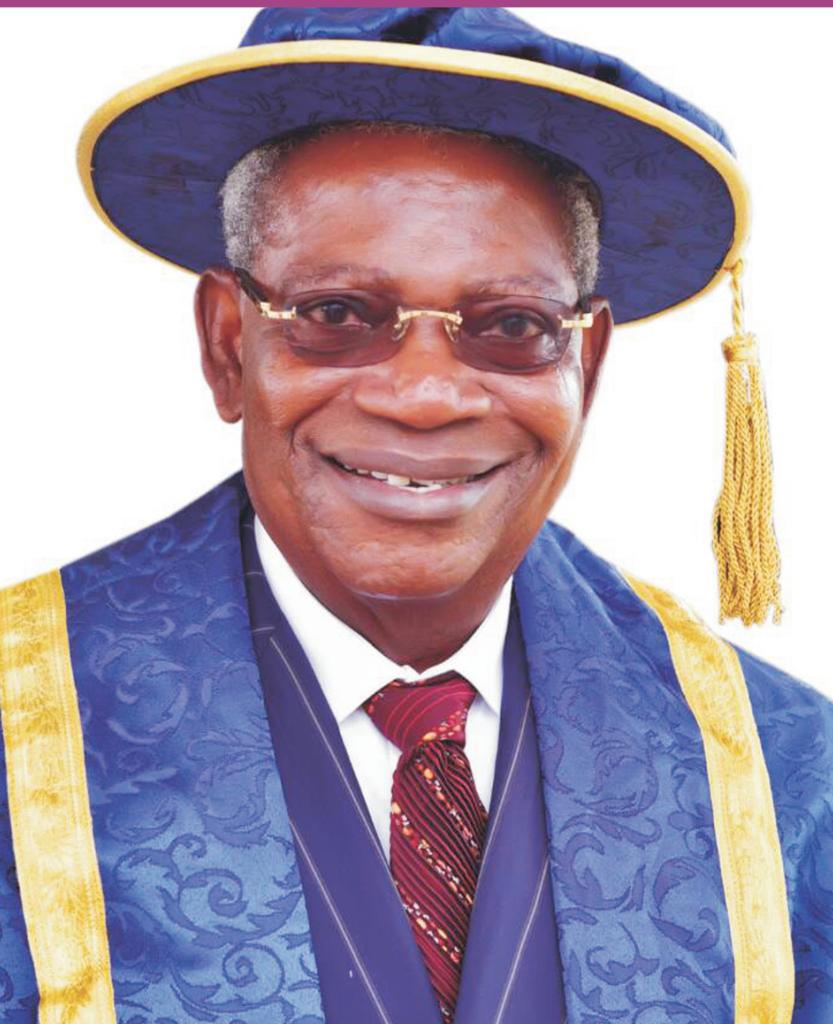
2017-2022

FEDERAL UNIVERSITY OF TECHNOLOGY

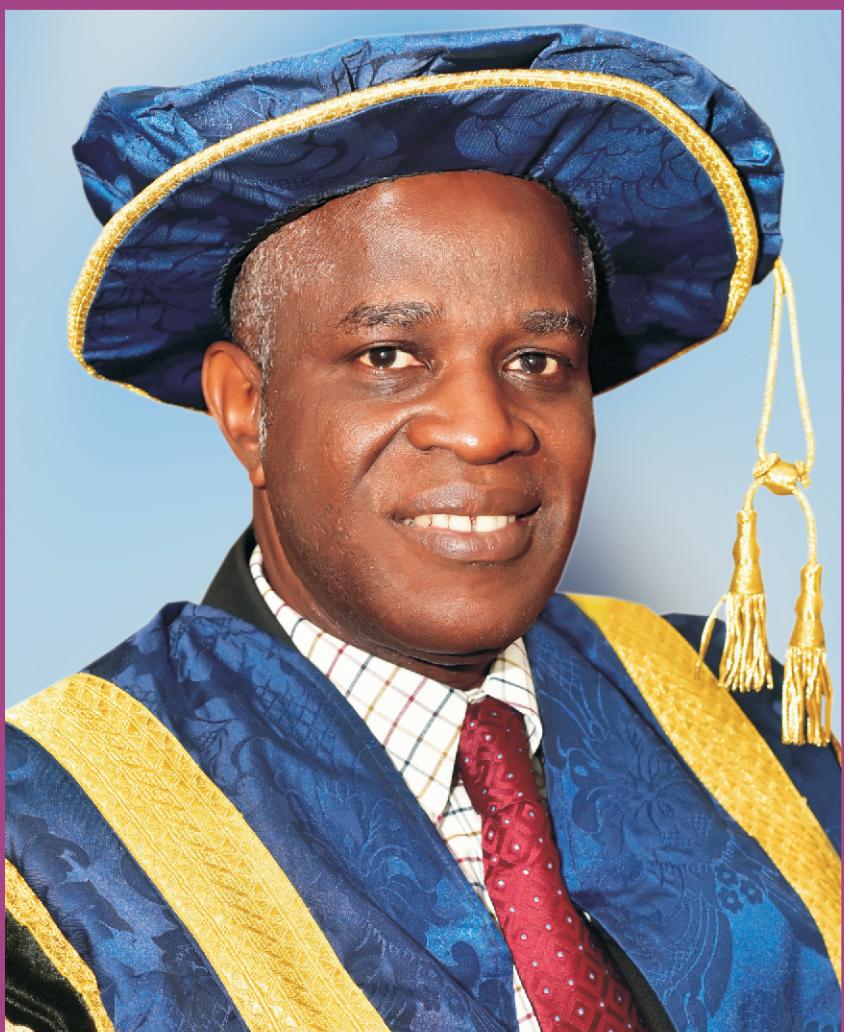
AKURE, ONDO STATE, NIGERIA



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Emir of Bauchi
*Chancellor***



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Federal University of Technology, Akure



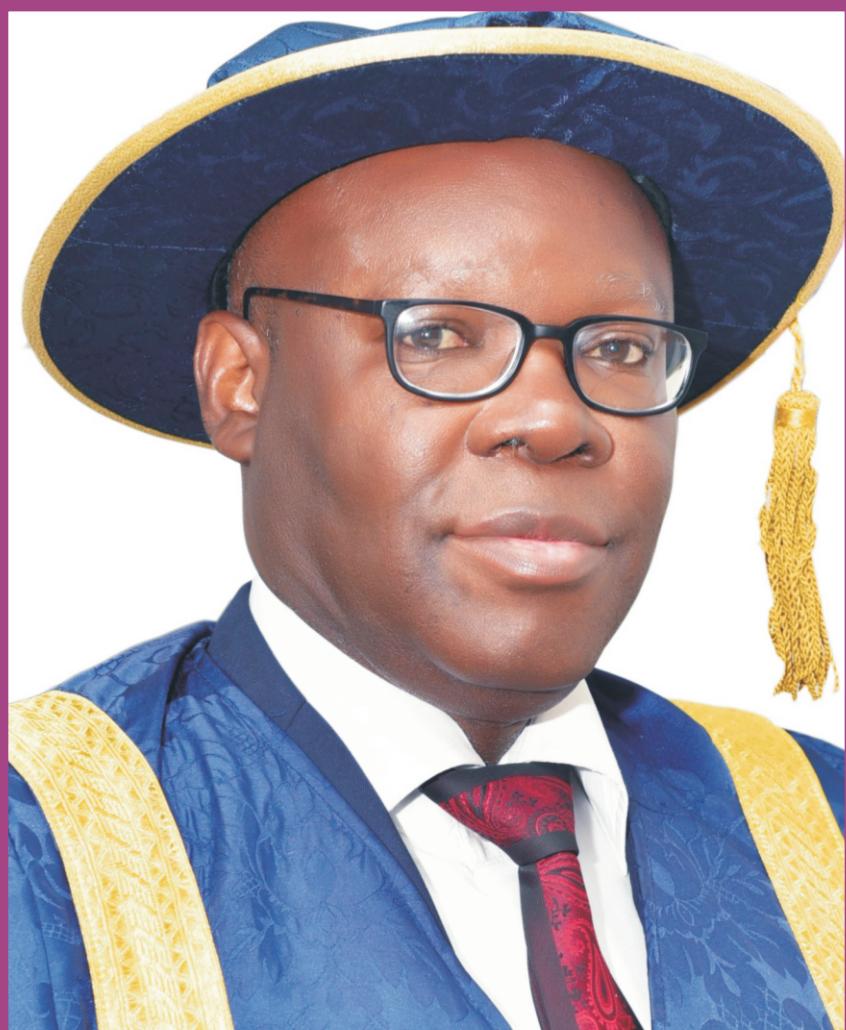
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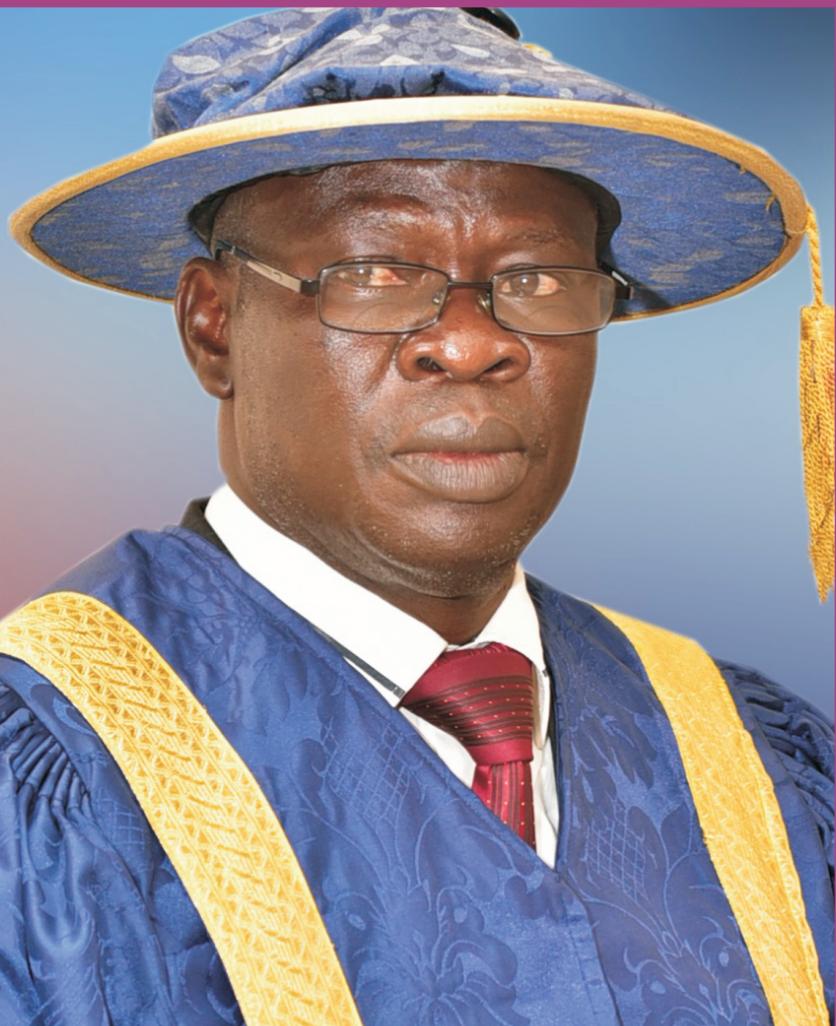
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**Prof. Moses Oludare Ajewole
Dean, SPGS**

FOREWORD

The School of Postgraduate Studies (SPGS) remains the hub for all scientific and technological research related activities in the Federal University of Technology, Akure. A regular compilation of the curricula and regulatory guidelines of the school is therefore imperative. The need for an up-to-date prospectus therefore gave birth to the 2015-2019 prospectus.

This prospectus represents the new vision driving the School of Postgraduate Studies. Effort has been made to incorporate far reaching suggestions and amendments by the University Senate and Board of Postgraduate Studies which covered the entire gamut of the running and administration of postgraduate programmes.

The prospectus followed the structure of its older issue with the incorporation of Regulation Governing Higher Degrees and Diplomas, the curricula, list of Postgraduate teaching staff, guidelines for the preparation and submission of Theses, the conduct of Theses Defence and regulations guiding conduct of examinations in the University. Hence, the prospectus serves as a compendium to both operators of postgraduate programmes and students on regulations guiding the running and administration of postgraduate programmes in the University. In furtherance of the implementation, various steps had been taken all aimed at ensuring that our postgraduate programmes meet international standards.

I therefore confidently recommend the prospectus to both Postgraduate administrators vis-à-vis students to serve as a guide for postgraduate programmes in the University.

Professor Joseph A. Fuwape, fnas, ffps
Vice Chancellor,
The Federal University of Technology, Akure,
Nigeria

October, 2017

PREFACE

The School of Postgraduate Studies (SPGS), Federal University of Technology, Akure was established in 1994 after the approval of the establishment of the Board of Postgraduate Studies by Council of the Federal University of Technology, Akure in 1986. The School was established as part of the Vision and Mission of the University in terms of the development of high level skilled manpower for the country.

The Postgraduate programmes of FUTA are intended to consolidate and build upon the solid intellectual and technological foundations, which the undergraduate courses in the University have been most carefully designed to achieve. The programme philosophies are designed to provide highly skilled professional and researchers in the fields of Engineering, Sciences, Agriculture, Environmental, Management, Earth and Mineral Sciences and allied disciplines.

In order to ensure that the Vision and Mission of the University are achieved, the School set the following Core Values for itself as a School that:

1. recognizes importance of Research for the attainment of Vision and Mission of the University;
2. promotes respect for established rules and regulations guiding the administration of Postgraduate programmes by all contributing Departments;
3. supports and encourages researches that are relevant to current needs of Ondo State and Nigeria as a whole; and
4. develops and runs graduate programmes that are strong, current, sharply focused and yet, robust enough to be responsive to the changing needs and demands for Science, Technology and Innovation (STI)as the bedrock for the rapid socio-economic transformation of the Society.

The School of Postgraduate Studies has undergone several innovative stages towards better service delivery in order to be in tandem with the global best practice. Some of the innovations introduced in the School are as follows:

- i. mounting of new Postgraduate courses;
- ii. harmonization of undergraduate and Postgraduate academic calendars;
- iii. e- SPGS: most of the operations of the SPGS are now on-line;
- iv. liberalization of postgraduate admission requirements: what is required for admission is the post-secondary graduation qualification, such as (any of or in combination with) Higher National Diploma (HND), Bachelor Degree, Postgraduate Diploma and Masters Degree, with the appropriate grade. Five credit passes in WASC/SSC/GCE “OL” results are no longer required for postgraduate admissions;
- v. strict adherence to academic programme: unnecessary elongation of academic programme is no longer allowed by the School of Postgraduate Studies;
- vi. election of three (3) sub-Deans: The Sub-Deans are in charge of the 3 postgraduate academic programmes in the School of Postgraduate Studies, which are Ph. D, M. Tech and PGD;
- vii. Semi autonomy status of the SPGS;
- viii. quality assurance: the grading system for Postgraduate programmes have been reviewed. Pass mark, which had hitherto been 40% has been reviewed upward to 50%, Supervisors are now assigned to postgraduate students at the point of admission while our M. Tech and Ph. D students are now required to publish in high rated journals before graduating from the University;
- ix. restructuring: review of M.Phil. programme to M.Phil and M.Phil/Ph.D. to run for 12-18 calendar months;
- x. timely response to students' requests;
- xi. publication of the revised SPGS Prospectus;

- xii. installation of 50KVA Diesel Generator to enhance regular power supply to SPGS;
- xiii. conducive work environment for all staff;
- xiv. improved relationship between staff and students;
- xv. Ph.D. graduates can now purchase academic robes on request;
- xvi. SPGS Building Extension is under-construction. The building when completed will host all Oral Exams and also have two (2) lecture rooms fully equipped with multimedia facilities.

Over the years, the School has grown in leaps and bounds from less than two hundred (200) students at inception to four thousand, seven hundred and seventy eight (4778) postgraduate students' population as at 2016/2017 session. The School graduated almost two thousand (2,000) postgraduate students in the 2016 Convocation ceremony, the highest ever produced in the history of the University. This underscored the wide acceptability of the Postgraduate programmes run by the School.

The lofty values set for ourselves influence the continuation of the tradition of publication of Prospectus for the use of students, administrators and other stakeholders. This edition of the Prospectus is designed to give an important summary of steps to take from the Registration to the point of graduation. Hence, it is a must read for applicants, students and administrators of postgraduate programmes in the University, such that they will all have a clear and better understanding of Federal University of Technology, Akure's School of Postgraduate Studies and its programmes. This new Prospectus also included rules and regulations guiding conduct of semester examinations.

We express appreciation to former Vice Chancellors, former Deans, Sub-Deans and Secretaries of the School for their various contributions towards the development of the School of Postgraduate Studies. In particular, the immediate past Vice Chancellor, Prof. A. G. Daramola, for the facelift witnessed in the School during his tenure.

Our gratitude also goes to the incumbent Vice Chancellor, Prof. J. O. Fuwape, for his interest in the on-going SPGS Building under-construction, the timely release of material resources for smooth operation in the school and for approving the publication of this Prospectus.

Prof. Moses Oludare Ajewole

Dean, SPGS

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SECTION ONE

BACKGROUND OF THE SCHOOL OF POSTGRADUATE STUDIES

1.1 Postgraduate Studies

The Federal Universities of Technology were set up to give prominence to technological training and provide the much required impetus for rapid technological and industrial development.

Their primary objectives are to:

- (i) develop and offer academic and professional programmes leading to the award of Certificates, Diplomas and degrees (Masters and Doctoral) which emphasize planning, adaptive, technical, maintenance, development, horizontal and productive skills in the engineering, scientific, agricultural, environmental, management, medical and allied professional disciplines;
- (ii) act as agents and catalysts, through postgraduate research and training for the most efficient, effective and economic utilization, exploitation and conservation of the country's natural, economic and human resources;
- (iii) offer to the general population, as a form of public services, the results of research and foster the practical applications of these results;
- (iv) identify technological problems and needs of the society relevant to the immediate localities of the University and solve them within the context of national needs; and
- (v) provide and promote sound basic scientific training reflecting indigenous culture and enhancing national unity, while at the same time ensuring the production of socially matured citizens.

In pursuance of these objectives and in recognition of the need for interdisciplinary approach to the solution of most practical problems and the application of science and technology to development, the Federal University of Technology, Akure has adopted the School system (as opposed to the Faculty) as the basic unit, thus endorsing the concept of a School as a fully integrated unit of a group of related subjects or disciplines which have a common academic interest in teaching and research.

1.2 The School of Postgraduate Studies, FUTA

As part of its Vision and Mission in terms of the development of high-level skilled manpower for the Country, Council of the Federal University of Technology, Akure approved the establishment of the Board of Postgraduate Studies in 1986, which metamorphosed into School of Postgraduate Studies in 1994.

In pursuance of the primary objective of the Federal Government for the establishment of the Universities of Technology, the Postgraduate programmes of the Federal University of Technology, Akure are intended to consolidate and build upon the solid intellectual and technological

foundations, which the undergraduate courses in the University have been most carefully designed to achieve.

The need for purposeful and functional education, which fosters technology for self-reliance, as an antidote to underdevelopment, is the underlying principle for the design of specific Postgraduate programmes in the various Schools of the University. The mission of the Postgraduate School includes the development and offering of academic and professional programmes leading to the award of postgraduate diplomas and higher degrees, which emphasize planning, adaptive and productive skills in the engineering, scientific, agricultural, environmental and allied professional disciplines.

Within the context of these general objectives therefore, graduate students of the Federal University of Technology, Akure are trained to:

- (i) have a very sound and in-depth knowledge of the basic principles underlying the body of knowledge they are being trained to master;
- (ii) develop a broad analytical mind that will enhance major intellectual and technological breakthroughs to improve the lot of man and the society; and
- (iii) be adequately versed in their discipline, and be competent to impart the knowledge to others in a conducive academic environment to ensure the continued existence of the system.

To facilitate the attainment of these objectives, the University, through the Boards of the School of Postgraduate Studies:

- (a) provides facilities for training and research for those, whose future careers will be teaching and research at tertiary institutions; and for those who may have to operate in research and development situations in the public or private sectors; and
- (b) provides both short and long-term training facilities aimed at improving and upgrading intellectual and cultural bases of high-level human resources that are indispensable for national development.

1.3 Boards of the School of Postgraduate Studies

Senate, at its Special Meeting of 15th April, 2015, considered the Report of Committee on the Overhauling of School of Postgraduate Studies and approved that a distinction be made between the Board of School of Postgraduate Studies and the Academic Board of School of Postgraduate Studies.

1.3.1 The Board of the School of Postgraduate Studies

1.3.1.1 Membership

Vice-Chancellor	-	Chairman
Dean, SPGS	-	Member
Sub-Dean (Ph.D)	-	Member
Sub-Dean (Masters)	-	Member

Sub-Dean (PGD)	-	Member	Director, CESRA	-	Member
University Librarian	-	Member	Director, CRET	-	Member
Director, CCE	-	Member	Director, International Office	-	Member
Director, CERAD	-	Member	Director, CRC	-	Member
Director, WASCAL	-	Member	Chairman, SPGAC of each School	-	Member
Director, Academic Planning	-	Member	One Representative for each Academic Department not below Senior Lecturer grade, with Ph.D degree who is not a registered Postgraduate Student in the University		
Director, CRC	-	Member		-	Member
Director, CRET	-	Member	All Postgraduate programme lecturers with Ph.D degree who are not registered Postgraduate Students in the University		
				-	Member
			Any Other Member(s) as may be approved By Senate	-	Member
				-	Member
Secretary, School of Postgraduate Studies	-	Secretary	Secretary, SPGS	-	Secretary
			Admission Officer, SPGS	-	In attendance
			Exams & Records Officer, SPGS	-	In attendance
			I.T. Officer, SPGS	-	In attendance

1.3.1.2. Functions of the Board of Postgraduate Studies

The Board of the School of Postgraduate Studies shall normally meet once at the end of every academic session. However, when the election of the Dean does not fall within the same period, a special meeting of the Board shall be convened.

The Board shall perform the following functions:

- (i) elect the Dean, School of Postgraduate Studies in accordance with the guidelines as stated in the University Statute;
- (ii) receive and consider reports of activities of the School of Postgraduate Studies at the end of every academic session;
- (iii) ensure compliance with rules and regulations governing the running of postgraduate academic programmes in the School of Postgraduate Studies;
- (iv) advise the Academic Board of Postgraduate Studies on how to improve the academic standard of the Postgraduate Studies to be in tandem with best global practices; and
- (v) perform any other responsibilities as may be delegated by the University Senate from time to time.

1.3.2 Academic Board of Postgraduate Studies

The Academic Board of Postgraduate Studies (ABPGS) shall be the clearing house for all academic matters in respect of SPGS.

1.3.2.1. Membership

Dean, SPGS	-	Chairman
Sub-Dean (Ph.D)	-	Member
Sub-Dean (Masters)	-	Member
Sub-Dean (PGD)	-	Member
University Librarian	-	Member
Director, CCE	-	Member
Director, CERAD	-	Member
Director, CESRA	-	Member
Director, WASCAL	-	Member
Director, Academic Planning	-	Member

1.3.2.2 Functions of the Academic Board

The Academic Board of Postgraduate Studies, which meets on the specified date every month on behalf of Senate, performs the following functions:

- (i) considers and recommends to Senate, submissions from Schools on admissions, registrations, fields of study, research proposals, nomination of supervisors and appointment of internal and external examiners;
- (ii) Approves the re-constitution of sub-committees of the Academic Board for Senate ratification;
- (iii) makes recommendations to Senate on candidates for the award of higher degrees, postgraduate diplomas and certificates;
- (iv) examines postgraduate curricula and examination programmes submitted by Departments through the School Postgraduate Advisory Committee and makes recommendations to Senate;
- (iv) receives Annual Progress Reports (APR) from individual student for the purpose of monitoring their progress;
- (v) interprets and operates postgraduate regulations, prepares an annual report of its activities for the consideration of the Board of Postgraduate Studies and report to Senate for approval;
- (v) prepares and operates a budget necessary for executing the functions of the School (paying particular attention to fellowships, scholarships, visiting lectureships and postgraduate programmes) and coordinates budgets for Postgraduate Studies from the Schools;
- (vi) recommends to Senate, periodically, a comprehensive review of general regulations, progress and development of Postgraduate Studies;
- (vii) takes and considers all results in respect of all programmes being run by Departments, and make appropriate recommendations to Senate;
- (viii) considers and approves applications for admission and extension of studentship in line with approved guidelines by Senate;
- (ix) oversees and regulates the programmes, admissions, examinations and records of all approved external bodies involved in the University's postgraduate degree programmes;

- (x) registers and keeps up-to-date records of all Postgraduate students;
- (xi) performs any other responsibilities that may be delegated to the School by Senate from time to time.

1.3.2.3 Membership and Functions of Committees of Academic Board of Postgraduate Studies for 2015/2016 Academic Session

S/N	Name of Committee	Membership	Terms of Reference
1.	Postgraduate Admissions Committee	<ul style="list-style-type: none"> • Prof. J.A. Fadamiro - Chairman • Prof. B. G. Ogunjemie (SAAT) - Member • Dr. P. K. Farayibi (SEET) - Member • Dr. (Mrs.) R.A. Oladapo (SET) - Member • Dr. S. Bayode (SEMS) - Member • Dr. E. A. Areo (SOS) - Member • Dr. O.J. Ojo (SMAT) - Member • Sub-Deans (PGD, Masters, Ph.D) - Member • Mrs. C.A. Opayinka - Member • Mr. F. A. Adunbi (AOI, Adm.) - Secretary 	<ul style="list-style-type: none"> i) To consider and advise the Board on recommendations from the various Departments in the University on Postgraduate admissions; ii) To consider and make appropriate recommendation to the Board on deferment of admissions; iii) To handle request for reactivation of studies, extension of time on programmes; iv) To handle review of regulations guiding Postgraduate programmes; v) To advise the Board from time to time on issues bothering on postgraduate admissions in the University.
2.	Thesis Title Registration Committee	<ul style="list-style-type: none"> • Prof. C. Arum - Chairman • Prof. I. B. Osho (SAAT) - Member • Prof. B. S. Ewulo (SAAT) - Member • Dr. S. O. Aro (SAAT) - Member • Dr. O. A. Adebayo (SOS) - Member • Dr. E. A. Areo (SOS) - Member • Dr. K. F. Akingbade (SEET) - Member • Dr. A. Oluleye (SEMS) - Member • Dr. S. Bayode (SEMS) - Member • Dr. G. Fadairo (SET) - Member • Dr. I. Aje (SET) - Member • Dr. M.S. Stephens (SMAT) - Member • Dr. O.J. Ojo (SMAT) - Member • Sub-Deans (Ph.D, Masters, PGD) Member • Mr. G.S. Jegede (AOII) - Secretary 	<ul style="list-style-type: none"> i) To receive, consider and advise the Board of Postgraduate Studies appropriately on submissions from various Departments in the University on Registration of Theses Titles, and appointment of Examiners for Masters and Doctoral Examinations, and Postgraduate Diploma results. ii) To handle lists of qualified postgraduate teachers from Departments iii) Recommend for postgraduate scholarships; and iv) To examine and advise as appropriate on postgraduate curricular and examinations programmes submitted by departments in the University.
3.	Results and Examiners' Report Committee	<ul style="list-style-type: none"> • Prof. B. S. Ewulo - Chairman • Prof. E. O. Ogolo (SOS) - Member • Dr. J. R. Adewunmi (SEET) - Member • Dr. M. K. Bolade (SAAT) - Member • Dr. Ayo Oluleye (SEMS) - Member • Dr. O.J. Ojo (SMAT) - Member • Dr. K. D. Adedayo (SOS) - Member • Dr. M. Oyinloye (SET) - Member • Ph.D/M.Tech/PGD Sub-Deans - Member • Mr. A.E. Adesida (SAR, Exams)- Secretary 	<ul style="list-style-type: none"> i) To consider and recommend as appropriate Examiners Report of Postgraduate candidate ii) To handle Postgraduate examination matters and results; iii) To move recommendation of appropriate time-table and circular for teaching and examination; iv) To handle review of regulations guiding postgraduate examination; v) To recommend appropriate time-table and circular for teaching and examination; and vi) To advise the Board from time to time on issues bothering on postgraduate examinations and results in the University.

S/N	Name of Committee	Membership	Terms of Reference
4.	Curriculum Management and Development Committee	<ul style="list-style-type: none"> • Prof. D. O. Oke - Chairman • University Librarian - Member • Director, Academic Planning - Member • Prof. J. O. Okunlola - Member • Dr A. Oyetunji (SEET) - Member • Prof. (Mrs.) A. O. Ogundare (SOS) -Member • Dr. (Mrs.) M.O. Olufayo (SAAT) - Member • Dr. O.A. Ademeso (SEMS) - Member • Mr. E.W.K. Ladanu (SMAT) - Member • Dr. E.B. Oladumiye (SET) - Member • Sub-Deans (PGD,Masters, Ph.D) -Members • Mr. G.S. Jegede (AO II) - Secretary 	<ul style="list-style-type: none"> i) To consider proposals for amendment of postgraduate courses, introduction of new programmes and advise the Board of Postgraduate Studies as appropriate; ii) To recommend to the Board of Postgraduate Studies, policies, criteria and order of priority in the academic development of the School of Postgraduate Studies and to keep these under constant review; iii) To recommend to the Board, desired change in the academic structure of postgraduate programmes in the University; iv) To recommend to the Board, desired change in the academic structure of postgraduate programmes in the University; v) To consider any other matter that may be referred to it by the Dean or Board of the Postgraduate Studies; and vi) To handle new or revised curricular from departments.
5.	Finance and Grants Committee	<ul style="list-style-type: none"> • Prof. J. O. Akinyede - Chairman • Prof. J. O. Okunlola (SAAT) - Member • Dr. O. O. Fasina (SAAT) - Member • Dr. M. Oyinloye (SET) - Member • Dr. S. Bayode (SEMS) - Member • Dr. (Mrs.) M. M. Melodi (SEET) - Member • Dr. A.S. Ajiboye (SOS) - Member • Dr. M.S. Stephens (SMAT) - Member • University Librarian or Rep - Member • Sub-Deans(PGD,Masters, Ph.D) - Members • Mr. F. A. Adunbi (AO I) - Secretary 	<ul style="list-style-type: none"> i) To handle appropriate fees and tuitions to be paid by postgraduate students as research assistantship, teaching assistantship, fellowship and awards that may be established; ii) To handle preparation of budgets and monitoring of the financial activities of the school; and iii) To advise on any other financial matters referred to it by the Dean or Board of Postgraduate Studies.
6.	Fellowship/ Linkages/ Academic Programme Exchange Committee	<ul style="list-style-type: none"> • Director International Office - Chairman • Director Academic Planning - Member • Director CERAD - Member • Director CESRA - Member • Director WASCAL - Member • Director CRC - Member • Prof. A. K. Onifade - Member • Sub-Deans (PGD,Masters, Ph.D) - Member • Mrs. A.G. Adebiyi (AO II) - Secretary 	<ul style="list-style-type: none"> i) To source for and identify both national and international opportunities for academic linkages, research fellowships and grants; and ii) To handle the development of Memoranda of Understanding (MoU) between Postgraduate School and other national/international institutes, industries, NGO, etc.

S/N	Name of Committee	Membership	Terms of Reference
7.	Annual Lecture/ Conference/ Seminar Committee	<ul style="list-style-type: none"> • Prof. G. Oboh - Chairman • Prof. A. O. Melodi - Member • Dr. A. Oluleye (SEMS) - Member • Dr. S. O. Aro (SAAT) - Member • Dr. (Mrs.) O. S. Omoba (SAAT) - Member • Dr. O. O. Olanrewaju (SEET) - Member • Dr. G. Fadairo (SET) - Member • Dr. (Mrs.) R. A. Oladapo (SET) - Member • Dr. A. T. Adediji (SOS) - Member • Dr. E. A. Areo (SOS) - Member • Dr. M.S. Stephens (SMAT) - Member • Sub-Deans (PGD, Masters, Ph.D) - Member • Mr. F. A. Adunbi - Secretary 	<ul style="list-style-type: none"> i) To make proposals to the Board of Postgraduate Studies on the School Annual Lecture Series; ii) To implement all such proposals as may be approved by the Dean or Board of Postgraduate Studies; iii) To facilitate and organize the School of Postgraduate Studies Annual Lectures; and iv) To make recommendations to the Dean or the Board of Postgraduate Studies as may be necessary from time to time.
8.	Committee on Endowment/ Development of School of Postgraduate Studies	<ul style="list-style-type: none"> • Prof. (Mrs.) A. O. Ogundare - Chairman • Dr. T. O. Fakokunde (SMAT) - Member • Dr. O. A. Ademeso (SEMS) - Member • Dr. (Mrs.) M.O. Olufayo (SAAT) - Member • Dr. J.R. Adewumi (SEET) - Member • Dr. A. C. Akinmoladun (SOS) - Member • Dr. O. A. Fatuyi (SET) - Member • Sub-Deans (PGD, Masters, Ph.D) - Member • Mr. A. E. Adesida (SAR, Exams) - Secretary 	<ul style="list-style-type: none"> i) To make relevant recommendations to the Board in respect of postgraduate endowment and development from time to time.
9.	Nigerian Universities Doctoral Theses Award Scheme (NUDTAS) Committee	<ul style="list-style-type: none"> • Prof. O. E. Lafe - Chairman • Prof. I.A. Adebayo (SAAT) - Member • Prof. B. O. Adewuyi (SEET) - Member • Prof. I. A. Amoo (SOS) - Member • Dr. A. E. Olajuyigbe (SET) - Member • Dr. G.O. Omosuyi (SEMS) - Member • Dr. T.O. Fakokunde (SMAT) - Member • Sub-Dean - (Ph.D) - Member • Mrs. A.G. Adebisi (AO II) - Secretary 	<ul style="list-style-type: none"> i) To select and appoint holders of NUDTAS awards; ii) To ensure that those nominated for the receipt of awards satisfy the nomination criterias; iii) To ensure that recommendations made conform to the rules for awards; and iv) To consider and advise the Board of Postgraduate Studies on conditions governing the awards.
10.	Accreditation Committee	<ul style="list-style-type: none"> • Prof. M. O. Ashamo - Chairman • Prof. O. A. Fagbenro (SAAT) - Member • Prof. J. O. Borode (SEET) - Member • Prof. J. A. B. Olujimi (SET) - Member • Prof. T. O. Ologunorisa (SEMS) - Member • Dr. S. E. Falodun (SOS) - Member • Dr. E. N. Olowookere (SMAT) - Member • Sub-Deans(PGD, Masters, Ph.D) Member • Mr. G.S. Jegede (A. O. II) - Secretary 	<ul style="list-style-type: none"> i) To bring up modalities for accreditation of Postgraduate Programmes; and ii) To ensure accreditation of all Postgraduate Programmes in the University.

S/N	Name of Committee	Membership	Terms of Reference
11.	Business Committee of Academic Board of Postgraduate Studies	<ul style="list-style-type: none"> • Prof. J. A. Fadamiro - Chairman • Prof. C. Arum (SEET) - Member • Prof. M. B. Oyun (SAAT) - Member • Prof. D. O. Oyetayo (SOS) - Member • Dr. F. Omosuyi (SEMS) - Member • Dr. T. O. Fakokunde (SMAT) - Member • Dr. V. O. Ajayi (WASCAL) - Member • Dr. O. A. Dahunsi (CESRA) - Member • Sub-Deans (Ph.D, Masters & PGD) - " • Mr. A.E. Adesida (SAR, Exams) - Secretary 	To serve as Clearing Sub Committee for all matters that will be considered by the ABSPGS
12.	Postgraduate Diploma Advisory Committee	<ul style="list-style-type: none"> • Dr. A. Oyetunji - Chairman • Sub-Dean (PGD) - Member • Departmental PGD Coordinators - Member • Mr. F. A. Adunbi (AO I) - Secretary 	To consider issues regarding Postgraduate Diploma Programme.
13	Bench Fees Utilisation Monitoring Committee	<ul style="list-style-type: none"> • Prof. T. O. Idowu - Chairman • Sub Dean, PhD - Member • Dr. K. D. Adedayo - Member • Dr. (Mrs.) O.S. Omoba - Member • Dr. E. N. Olowookere - Member • Dr. (Mrs.) M. M. Melodi - Member • Dr. O.A. Awodele - Member • Dr. O. A. Ademeso - Member • Mrs. A.G. Adebiyi (AO II) - Secretary 	<ul style="list-style-type: none"> i) To ensure that Departmental submission/request on Bench fees are based on the needs of the Department and as recommended by respective Departmental PG Committee; ii) To ensure that items approved for purchase/supply are provided to time and are available for use in the Department with appropriate branding; iii) To ensure that there is evidence of utilization of previous allocation before a Department enjoys another allocation; iv) To submit Annual Report to the Dean, SPGS on Utilisation of postgraduate Bench Fees in the University; and v) Any other recommendations that could enhance the administration and utilization of PG Bench Fees in Departments.
14	Annual Progress Report Committee	<ul style="list-style-type: none"> • Prof. V. O. Oyetayo - Chairman • Dr. M. K. Bolade (SAAT) - Member • Dr. P. K. Farayibi (SEET) - Member • Dr. O. A. Ademeso (SEMS) - Member • Dr. O. A. Fatuyi (SET) - Member • Dr. O. A. Jesuleye (SMAT) - Member • Dr. E. A. Areo (SOS) - Member • Chief Programmer, SPGS - Member • Sub-Deans(PGD, Masters, Ph.D) - Member • Mrs. A. O. Ojo (SEO) - Secretary 	<ul style="list-style-type: none"> i. To collate and consider the annual progress reports of Postgraduate candidates as appropriate; ii. To handle postgraduate annual progress report matters and make recommendations to the Academic Board of Postgraduate Studies; iii. To advise the Academic Board from time to time on issues bothering on Postgraduate annual progress report; and iv. Other duties that bother on students' report as may be assigned to it by the Academic Board of Postgraduate Studies.

S/N	Name of Committee	Membership	Terms of Reference
15	Cross Bodrer Collaborative Reasarch Committee	<ul style="list-style-type: none"> • Prof. O. E. Lafe - Chairman • Prof. O. J. Olakunle (SEET) - Member • Prof. E. A. Oguntade (SAAT) - Member • Prof. K. O. Ogunjobi (SEMS) -Member • Dr. S. E. Falodun (SOS) - Member • Dr. C. Folorunso (SET) - Member • Dr. O. J. Ojo (SMAT) - Member • Representative of Dean SHHT - Member • Mr. G. S. Jegede (AO II) - Secretary 	<ul style="list-style-type: none"> i. To search for tropical and relevant ongoing graduate researches that could enjoy collaborative efforts within and outside the University; ii. To provide necessary internal and external linkage, (with funding agencies) that will encourage, promote and enhance collaborative researches; iii. To provide necessary framework that will encourage collaborative graduate researches in the University; iv. To engage communities, policy makers in graduate researches that could be of immense benefits to the Nigerian state; v. To facilitate the dissemination of collaboration research findings and advocate for change; vi. To recommend from time to time policy(ies) that could enhance collaborative graduate research in the University; and vii. To make the report of its activities available for the consideration of the ABPGS quarterly.

SECTION TWO
POSTGRADUATE ACADEMIC PROGRAMMES IN THE UNIVERSITY

2.0 LIST OF HIGHER DEGREE PROGRAMMES INCLUDING POSTGRADUATE DIPLOMA (PGD) IN THE UNIVERSITY.

- (i) Doctor of Philosophy (Ph. D)
- (ii) Master of Philosophy (M. Phil.)/Ph.D
- (iii) Master of Agricultural Technology (M. Agric. Tech.); Master of Engineering (M. Eng.); and Master of Technology (M. Tech.).
- (iv) Postgraduate Diploma (PGD)

2.1 SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY (SAAT)

Doctor of Philosophy (Ph. D); Master of Agricultural Technology (M. Agric. Tech.); Master of Technology (M.Tech. for only Department of Food Science and Technology); and Postgraduate Diploma (PGD) are available in the following Departments and Options:

- (i) **Department of Agricultural Extension and Communication Technology (AEC)**
 - (a) PGD Agric. in Extension and Communication Technology
 - (b) M. Agric. Tech. in Agric. Extension & Communication Technology
 - i) General Extension
 - ii) Rural Development
 - iii) Rural Sociology
 - iv) Technology Transfer
 - v) Communication
 - (c) Ph.D
 - i) General Extension
 - ii) Rural Development
 - iii) Rural Sociology
 - iv) Technology Transfer
 - v) Communication Technology
- (ii) **Department of Agricultural and Resource Economics (ARE)**
 - (a) M. Agric. Tech. Agric. Resource Economics
 - i) Production Economics
 - ii) Environmental Economics
 - iii) Farm Management
 - iv) Finance & Marketing
 - (b) Ph. D
 - i) Production Economics
 - ii) Environmental Economics
 - iii) Farm Management
 - iv) Finance & Marketing
- (iii) **Department of Animal Production and Health (APH)**
 - (a) PGD Animal Production and Health
 - (b) M. Agric. Tech. (Animal Production)

- i) Agricultural Biochemistry and Nutrition
- ii) Animal Breeding and Genetics
- iii) Animal Production and Management (Poultry, Swine, Sheep and Goat, Rabbit/Micro-livestock)
- iv) Animal Physiology (Reproductive Physiology)
- (c) M. Agric. Tech. (Animal Health)
 - i) Animal Parasitology
 - ii) Animal Microbiology
 - iii) Farm Hygiene and Disease Prevention
- (d) Ph. D (Animal Production)
 - i) Agricultural Biochemistry and Nutrition
 - ii) Animal Breeding and Genetics
 - iii) Animal Production and Management (Poultry, Swine, Sheep and Goat, Rabbit/Micro-livestock)
 - iv) Animal Physiology
- (e) Ph. D (Animal Health)
 - i) Animal Parasitology
 - ii) Animal Microbiology
 - iii) Farm Hygiene and Disease Prevention

Department of Crop, Soil and Pest Management (CSP)

- (a) PGD (Crop, Soil and Pest Management)
- (b) M. Agric. Tech.(Crop Management Technology)
 - i) Plant Systematics & Taxonomy
 - ii) Plant Breeding & Genetics
 - iii) Plant Physiology
 - iv) Horticulture
 - v) Agronomy
- (c) M. Agric. Tech (Soil Management Technology)
 - i) Soil Fertility
 - ii) Fertilizer Use Technology
 - iii) Land Survey and Management
 - iv) Plant Nutrition
 - v) Soil Survey & Classification
- (d) M. Agric. Tech (Pest Management Technology)
 - i) Crop Entomology
 - ii) Plant Pathology
 - iii) Nematology
 - iv) Plant Virology
 - v) Weed Management
 - vi) Weed Biology & Ecology
- (e) Ph. D (Crop Management Technology)
 - i) Plant Systematics & Taxonomy
 - ii) Plant Breeding & Genetics
 - iii) Plant Physiology
 - iv) Horticulture
 - v) Agronomy

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|--|---|
| <p>(f) Ph. D (Soil Management Technology)</p> <ul style="list-style-type: none"> i) Soil Fertility ii) Fertilizer use Technology iii) Land Survey and Management iv) Plant Nutrition v) Soil Survey & Classification <p>(g) Ph. D (Pest Management Technology)</p> <ul style="list-style-type: none"> i) Crop Entomology ii) Plant Pathology iii) Nematology iv) Plant Virology v) Weed Management vi) Weed Biology & Ecology | <p>i) Forest Resources Management</p> <ul style="list-style-type: none"> ii) Forest Biology/Silviculture iii) Agroforestry/Soils iv) Wood Science Technology v) Wood Products Technology vi) Forest Inventory & Biometrics <p>(c) PhD (Forestry & Wood Technology)</p> <ul style="list-style-type: none"> i) Forest Resources Management ii) Forest Biology/Silviculture iii) Agroforestry/Soils iv) Wood Science Technology v) Wood Products Technology vi) Forest Inventory & Biometrics |
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- (v) Department of Fisheries and Aquaculture Technology (FAT)**
- (a) PGD (Fisheries and Aquaculture Technology)
 - (b) M. Agric. Tech. Fisheries & Aquaculture Technology
 - i) Aquaculture
 - ii) Fisheries Management
 - iii) Fish Nutrition
 - iv) Fish Breeding
 - v) Fisheries Economics
 - vi) Fish Processing & Utilization
 - (c) Ph.D (Fisheries & Aquaculture Technology)
 - i) Aquaculture
 - ii) Fisheries Management
 - iii) Fish Nutrition
 - iv) Fish Breeding
 - v) Fisheries Economics
 - vi) Fish Processing & Utilization
- (vi) Department of Ecotourism and Wildlife Management (EWM)**
- (a) PGD Ecotourism and Wildlife Management
 - (b) M. Agric. Tech. Ecotourism & Wildlife Management
 - i) Wildlife Management
 - ii) Biodiversity Ecology
 - iii) Ecotourism Management
 - iv) Wildlife Domestication
 - (c) Ph. D (Ecotourism & Wildlife Management)
 - i) Wildlife Management
 - ii) Biodiversity Ecology
 - iii) Ecotourism Management
- (vii) Department of Forestry & Wood Technology (FWT)**
- (a) PGD
 - i) Forestry and Wood Technology
 - ii) Environmental Management
 - (b) M. Agric. Tech. Forestry & Wood Technology
- In addition to the above-stated options, M.Agric.Tech and PhD students may conduct research in the following areas:
- i) Herbal Science Natural Therapeutic
 - ii) Biocomposite Technology
 - iii) Furniture Design & Production
 - iv) Wood Processing Technology
- (viii) Department of Food Science and Technology (FST)**
- (a) PGD Food Science and Technology
 - (b) M. Tech. Food Science and Technology
 - i) Food Chemistry
 - ii) Human Nutrition
 - iii) Food Processing
 - iv) Post-Harvest Technology
 - (c) PhD (Food Science and Technology)
 - i) Food Chemistry
 - ii) Human Nutrition
 - iii) Food Processing
 - iv) Post-Harvest Technology

2.2. SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY (SEET)

Doctor of Philosophy (Ph.D), Master of Engineering (M.Eng.) and Postgraduate Diploma (PGD) programmes are available in the following Departments and Options:

- (i) Department of Agricultural and Environmental Engineering (AGE)**
- (a) PGD Agricultural and Environmental Engineering
 - (b) M. Eng. Agric. and Environmental Engineering
 - i) Farm Power and Machinery
 - ii) Soil and Water Engineering
 - iii) Processing and Storage Engineering
 - iv) Farm Structures and Environmental Control
 - v) Alternative Energy
 - (c) PhD Agric. and Environmental Engineering

	<ul style="list-style-type: none"> i) Farm Power and Machinery ii) Soil and Water Conservation Engineering iii) Post-Harvesting Engineering iv) Farm Structures and Environmental Control v) Alternative Energy 	<ul style="list-style-type: none"> v) Energy Systems vi) Thermo fluids vii) Computational Fluid Dynamics
(ii)	Department of Civil and Environmental Engineering (CVE)	(v)
	<ul style="list-style-type: none"> (a) PGD Civil and Environmental Engineering (b) M. Eng. Civil and Environmental Engineering <ul style="list-style-type: none"> i) Geotechnical Engineering ii) Structural Engineering iii) Transportation Engineering iv) Water Resources and Environmental Engineering v) Construction Engineering (c) Ph. D Civil and Environmental Engineering <ul style="list-style-type: none"> i) Geotechnical Engineering ii) Structural Engineering iii) Transportation Engineering iv) Highway Maintenance & Rehabilitation Engineering v) Water Resources and Environmental Engineering vi) Construction Engineering 	Department of Metallurgical & Materials Engineering (MME)
		<ul style="list-style-type: none"> (a) PGD Metallurgical & Materials Engineering (b) M. Eng. Metallurgical & Materials Engineering <ul style="list-style-type: none"> i) Production/Mechanical Metallurgy ii) Physical Metallurgy/Corrosion Engineering iii) Materials Engineering (c) Ph. D Metallurgical & Materials Engineering <ul style="list-style-type: none"> i) Production/Mechanical Metallurgy ii) Physical Metallurgy/Corrosion Engineering iii) Materials Engineering
(iii)	Department of Electrical & Electronics Engineering (EEE)	(vi)
	<ul style="list-style-type: none"> (a) PGD Electrical and Electronics Engineering (b) M. Eng. Electrical & Electronics Engineering <ul style="list-style-type: none"> i) Power Systems Engineering ii) Communications Engineering iii) Control Engineering (c) Ph. D Electrical & Electronics Engineering <ul style="list-style-type: none"> i) Power Systems Engineering ii) Communications Engineering iii) Control Engineering 	Department of Mining Engineering (MNE)
		<ul style="list-style-type: none"> (a) PGD Mining Engineering (b) M. Eng. Mining Engineering <ul style="list-style-type: none"> i) Surface Mining ii) Underground Mining iii) Rock Mechanics iv) Mineral Processing v) Mine Management and Mineral Economics vi) Mine Safety and Environment vii) Mine Surveying & Photogrammetry (c) Ph. D Mining Engineering <ul style="list-style-type: none"> i) Surface Mining ii) Underground Mining iii) Rock Mechanics iv) Mineral Processing v) Mine Management and Mineral Economics vi) Mine Safety and Environment vii) Mine Surveying & Photogrammetry
(iv)	Department of Mechanical Engineering (MEE)	
	<ul style="list-style-type: none"> (a) PGD Mechanical Engineering (b) M. Eng. Mechanical Engineering <ul style="list-style-type: none"> i) Production Engineering ii) Industrial Engineering/Operations Research iii) Building Services Engineering iv) Automotive Engineering v) Energy Systems vi) Thermo fluids vii) Computational Fluid Dynamics (c) Ph. D Mechanical Engineering <ul style="list-style-type: none"> i) Production Engineering ii) Industrial Engineering/Operations Research iii) Building Services Engineering iv) Automotive Engineering 	<p>2.3 SCHOOL OF ENVIRONMENTAL TECHNOLOGY (SET)</p> <p>Doctor of Philosophy (Ph. D), Master of Technology (M. Tech.) and Postgraduate Diploma (PGD) programmes are available in the following Departments and Options:</p> <ul style="list-style-type: none"> (i) Department of Architecture (ARC) <ul style="list-style-type: none"> (a) PGD Architecture (b) M.Tech. Architecture (c) Master of Philosophy (M.Phil.) (d) M.Phil./Ph.D (e) Ph.D Architecture (ii) Department of Urban and Regional Planning <ul style="list-style-type: none"> (a) PGD Urban and Regional Planning (b) M.Tech. Urban and Regional Planning (c) Ph.D Urban and Regional Planning

- (iii) **Department of Estate Management (ESM)**
- (a) PGD Estate Management
 - (b) Master of Real Estate (MRE) (Professional)
 - i) Land Management
 - ii) Facilities Management
 - iii) Plant and Machinery Valuation
 - (c) M. Tech. (Academic)
 - i) Estate Management
 - (d) Ph. D Estate Management
- (iv) **Department of Quantity Surveying (QSV)**
- (a) PGD
 - i) Quantity Surveying
 - ii) Construction Management
 - (b) M. Tech. Quantity Surveying
 - i) Cost Management
 - ii) Construction Economics
 - iii) Quantity Surveying Practices
 - iv) Procurement Studies
 - (c) Ph. D
- (v) **Department of Industrial Design (IDD)**
- (a) PGD Industrial Design
 - i) Ceramics Design
 - ii) Graphics
 - iii) Textile Design
 - (b) M.Tech. Industrial Design
 - i) Ceramics Design
 - ii) Graphics
 - iii) Textile Design
 - (c) Ph. D Industrial Design
 - i) Ceramics Design
 - ii) Graphics
 - iii) Textile Design
- 2.4 SCHOOL OF EARTH AND MINERAL SCIENCES (SEMS)**
 Doctor of Philosophy (Ph.D), Master of Technology (M.Tech.) and Postgraduate Diploma (PGD) Programmes are available in the following Departments and Options:
- (i) **Department of Applied Geology (AGY)**
 - (a) PGD Applied Geology
 - (b) M. Tech. Applied Geology
 - i) Mineral Exploration
 - ii) Remote Sensing
 - iii) Hydrogeology and Engineering Geology
 - iv) Petroleum and Sedimentary Geology
 - (c) Ph. D Applied Geology
 - i) Remote Sensing
 - ii) Hydrogeology
 - iii) Engineering Geology
 - iv) Petroleum Geology
 - v) Sedimentology
 - vi) Structural Geology
 - (ii) **Department of Applied Geophysics (AGP)**
 - (a) PGD Exploration Geophysics
 - (b) M. Tech. Exploration Geophysics
- i) Petroleum Exploration
 ii) Mining Geophysics
 iii) Groundwater/Environmental/ Engineering Geophysics
- (c) Ph.D Exploration Geophysics
 i) Petroleum Exploration
 ii) Mining Geophysics
 iii) Groundwater/Environmental/ Engineering Geophysics
- (iii) **Department of Meteorology and Climate Science (MCS)**
- (a) PGD Meteorology
 - (b) M. Tech. Meteorology
 - i) Numerical Weather Forecasting
 - ii) Agrometeorology
 - (c) Ph. D Meteorology
 - i) Numerical Weather Forecasting
 - ii) Synoptic Meteorology
 - iii) Aviation Meteorology
 - iv) Satellite Meteorology
 - v) Air Pollution Meteorology
 - vi) Agro meteorology
- 2.5 SCHOOL OF MANAGEMENT TECHNOLOGY (SMAT)**
 Doctor of Philosophy (Ph.D), Master of Technology (M.Tech.) and Postgraduate Diploma (PGD) programmes are available in the following Departments and Options:
- (i) **Department of Project Management Technology (PMT)**
 - (a) PGD
 - i) Project Management Technology
 - (b) M. Tech.
 - i) Project Management Technology
 - ii) Management Sciences
 - (c) Ph. D Project Management Technology
 - i) Project Management Technology
 - ii) Management Sciences
 - (ii) **Department of Transport Management Technology (TMT)**
 - (a) PGD Transport Management Technology
 - (b) M. Tech. Transport Management Technology
 - i) Land Transport Management
 - ii) Maritime Transport Management
 - iii) Air Transport Management
 - (c) Ph. D Transport Management Technology
 - i) Land Transport Management Technology
 - ii) Maritime Transport Management Technology
 - iii) Air Transport Management Technology
- 2.6 SCHOOL OF SCIENCES (SOS)**
 Doctor of Philosophy (Ph.D) and Master of Technology (M.Tech.), and Postgraduate Diploma (PGD) programmes are available in the following Departments and Options:

- (i) **Department of Biochemistry (BCH)**
- (a) PGD Biochemistry
 - i) Applied Biochemistry
 - ii) Clinical Biochemistry
 - (b) M. Tech. Applied Biochemistry
 - i) Enzymology
 - ii) Microbial Biochemistry
 - iii) Food/Nutritional Biochemistry
 - iv) Toxicology
 - (c) Ph. D Biochemistry
 - i) Enzymology
 - ii) Microbial Biochemistry
 - iii) Food/Nutritional Biochemistry
 - iv) Toxicology
- (ii) **Department of Biology (BIO)**
- (a) M. Tech. Biology
 - i) Food Storage Technology
 - ii) Applied Parasitology
 - iii) Environmental Biology and Public Health
 - (b) Ph. D Biology
 - i) Applied Parasitology
 - ii) Storage Microbiology
 - iii) Storage Entomology/Applied Entomology
- (iii) **Department of Microbiology (MCB)**
- (a) PGD Microbiology
 - i) Food Microbiology
 - ii) Medical Microbiology
 - (b) M. Tech. Microbiology
 - i) Food Microbiology
 - ii) Environmental Microbiology
 - iii) Medical Microbiology
 - (c) Ph.D Microbiology
 - i) Food Microbiology
 - ii) Environmental Microbiology
 - iii) Medical Microbiology
- (iv) **Department of Chemistry (CHE)**
- (a) PGD Industrial Chemistry
 - (b) M. Tech.:
 - i) Analytical Chemistry
 - ii) Industrial Chemistry
 - iii) Environmental Chemistry
 - (c) Ph. D:
 - i) Analytical Chemistry
 - ii) Industrial Chemistry
 - iii) Environmental Chemistry
 - iv) Food Chemistry
 - v) Polymer Chemistry
 - vi) Organic Chemistry
 - vii) Inorganic Chemistry
 - viii) Physical Chemistry
- (v) **Department of Mathematical Sciences (MTS)**
- (a) M. Tech. Industrial Mathematics
 - i) Dynamics of Structure (Solid Mechanics)
 - (b) Ph. D Mathematics
 - ii) Numerical Methods in Ordinary Differential Equations (ODE)
 - iii) Fluid Mechanics
 - iv) Optimal Control
 - (c) M. Phil. Mathematics
 - i) Dynamics of Structure (Solid Mechanics)
 - ii) Numerical Methods in Ordinary Differential Equations (ODE)
 - iii) Fluid Mechanics
 - iv) Optimal Control
- (vi) **Department of Computer Science (CSC)**
- (a) PGD Computer Science
 - (b) M. Tech. Computer Science
 - (c) Ph.D. Computer Science
- (vii) **Department of Physics (PHY)**
- (a) PGD Physics Electronics
 - (b) M. Tech.:
 - i) Condensed Matter Physics
 - ii) Electronic Measurements & Instrumentation Physics
 - iii) Communication Physics
 - iv) Radiation and Health/Medical Physics
 - v) Lower Atmospheric Physics
 - (c) Master of Philosophy (M. Phil.)
 - i) Condensed Matter Physics
 - ii) Electronic Measurements & Instrumentation Physics
 - iii) Communication Physics
 - iv) Space Physics
 - v) Atmospheric Physics
 - vi) Radiation and Health/Medical Physics
 - vii) Energy Physics
 - (d) M. Phil./Ph.D
 - i) Condensed Matter Physics
 - ii) Electronic Measurements & Instrumentation Physics
 - iii) Communication Physics
 - iv) Space Physics
 - v) Atmospheric Physics
 - vi) Radiation and Health/Medical Physics
 - vii) Energy Physics
 - (e) Ph. D:
 - i) Condensed Matter Physics
 - ii) Electronic Measurements & Instrumentation Physics
 - iii) Communication Physics
 - iv) Radiation and Health/Medical Physics
 - v) Lower Atmospheric Physics
- (viii) **Department of Statistics (STA)**
- (a) PGD Statistics
 - (b) M. Tech. Statistics
 - (c) Ph. D Statistics
 - i) Econometrics
 - ii) Mathematical Statistics
 - iii) Operations Research

In addition to the above, students for M. Tech and Ph. D degree programmes may conduct research in the following areas:

- i) Experimental Design
- ii) Multivariate Analysis
- iii) Quality Control and Technometrics
- iv) Time Series Analysis
- v) Sampling Techniques

- (f) Meteorology and Climate Change
 - (g) Soil Analysis and Agricultural Management
 - (h) Health and Social Development
 - (i) Crime Mapping, Peace and Security and Military Intelligence
 - (j) Urban Planning and Analysis
 - (k) Geovisualisation and Mapping Technology.
- www.rectas.org.

2.7 COLLABORATION WITH OTHER RESEARCH CENTRES

- (i) The University in collaboration with the Regional Centre for Training in Aerospace Surveys (RECTAS), Ile-Ife, Nigeria, offers Master in Geoinformation Technology (MGIT) in the following fields of specialization:
 - (a) Disaster Risk Management
 - (b) Environmental Management
 - (c) Land Resource Management
 - (d) Natural Resource Management
 - (e) Hydrology and Water Resource Management

- (ii) The University also in collaboration with African Regional Centre for Space Science and Technology Education-English (ARCSSTE-E), Ile-Ife, Nigeria (affiliated to the United Nations), offers Master of Space Science and Technology (MSST) in the following Options/specializations:

- (a) Satellite Communication
- (b) Basic Space Physics
- (c) Satellite Meteorology, and
- (d) Remote Sensing and GIS

www.arcsstee.org.

SECTION THREE

ADMISSION AND PROGRAMME DURATION

3.0 General Procedure for Admission into the School of Postgraduate Studies

The procedure for admitting students into the School of Postgraduate Studies is as follows:

- (i) About five months to the end of each session, advertisement for admissions for the session that follows is displayed in selected national dailies and in the SPGS Portal on the FUTA website. Candidates access the application form online after making appropriate payment through banks on e-tranzact platform. After the close of applications, the forms submitted by the applicants are downloaded by the Departments and each Departmental Postgraduate Committee shortlists and recommends those candidates found eligible for admission to the Postgraduate Admissions Committee for the final consideration and approval of the Academic Board of Postgraduate Studies. Subsequently, provisional letters of admission are issued to the candidate by the School of Postgraduate Studies.
- (ii) On arrival at the University, the student shall present original copies of his/her certificates and other credentials for screening by both the Departmental and the School of Postgraduate Studies. It is after the successful completion of this that the student shall proceed to register on the SPGS portal after payment of the necessary fees and shall then be eligible for Matriculation.

3.1 General Admission Requirements

Generally, presentation of relevant Higher National Diploma (HND) and Bachelor Degree or Postgraduate Diploma with the requisite grade as well as NYSC discharge or exception certificate shall now suffice for admission into postgraduate Diploma and Masters degree programmes of the University, respectively. For M.Phil., M.Phil./Ph.D and Ph.D, relevant Masters' grade and acceptable proposal should be enough to ensure admission into the programmes.

NOTE: Applicants are no longer required to present 'O' level results for admission

3.1.1. Postgraduate Diploma (PGD)

- (i) A first degree, not lower than Third Class, in the relevant discipline.
- (ii) Higher National Diploma (HND) of at least Lower Credit level or its equivalent in the relevant or related discipline.
- (iii) Professional qualifications such as ACA, AIB, ACCA, ACIS or its equivalent are acceptable for Postgraduate Diploma in Computer Science only.

3.1.2 Master of Agric. Technology/Master of Engineering/Master of Technology (M. Agric. Tech./M. Eng./M. Tech.)

- (i) A good Bachelor's degree of at least Second

Class Lower Division of The Federal University of Technology, Akure, in the appropriate discipline. A good Bachelor's degree from other recognized Universities, in the appropriate discipline. Higher National Diploma of at least Lower Credit level and in addition to a Postgraduate Diploma (at Upper Credit level) in the appropriate discipline.

3.1.3

- (i) **Master of Philosophy (M. Phil.); M.Phil./Ph.D**
M.Phil candidates must have scored between 50% and 54% or 2.4 – 2.99 at the Masters Degree programme.
- (ii) **M.Phil/Ph.D:** candidate shall have scored between 55% and 59.9% or 3.0 – 3.49 at the Masters Degree Programme.
- (iii) For candidates who wish to change to another Department, a Master's Degree from a relevant discipline with a CGPA not less than 3.0 on a 5 point scale or at least a score of 60% is required for M.Phil and M.Phil/Ph.D. They shall in addition take required courses by the proposed Department

NOTE: A CGPA of 2.4 on a 5-point scale minimum shall be required for FUTA graduates admitted from 2016/2017 academic session onward

3.1.4 Professional Masters Degree

(a) Master of Real Estate (MRE) Programme-Professional

Candidate must possess any of the following qualifications in addition to satisfying the general University regulations for admission:

- (i) B. Tech in Estate Management with at least Second Class (Honours) Lower Division of the Federal University of Technology, Akure or the equivalent.
- (ii) Post graduate Diploma in Estate Management with a minimum of Lower Credit of the Federal University of Technology, Akure or any recognized University.
- (iii) Candidates who possess a minimum of Second Class (Honours) Lower Division First Degree in Mechanical Engineering or Production Engineering may be admitted into Facilities Management or Plant and Machinery Valuation option.
- (iv) Candidates who possess a minimum of Second Class (Honours) Lower Division First Degree in; Electrical engineering; Building; Architecture; or Quantity surveying may be admitted into Facilities Management option.
- (v) Candidates who possess a minimum of a Second Class (Honours) Lower Division First Degree in; Law; Urban and Regional Planning; or Land surveying may be admitted into Land Management option.

3.1.5	Doctor of Philosophy (Ph.D)	THE SECRETARY, SCHOOL OF POSTGRADUATE STUDIES ATTN: DEPARTMENT OF THE FEDERAL UNIVERSITY OF TECHNOLOGY, P.M.B. 704, AKURE, NIGERIA.
(a)	Direct Admission <ul style="list-style-type: none"> (i) A good Master's degree in the appropriate discipline with a CGPA of 3.50 and/or 60% minimum average score. (ii) Any other qualification approved by Senate 	
(b)	Admission by conversion <p>A candidate who enters an M. Phil, M.Phil/ Ph.D programme may convert to Ph.D programme if he/she fulfils the following:</p> <ul style="list-style-type: none"> (i) Candidate must have successfully presented at least two seminars: proposal and progress seminars. (ii) Candidate must have presented a detailed report of research-work done up to the time of seeking conversion and submitted to the School of Postgraduate Studies any relevant published and unpublished materials that can be assessed by the Department. (iii) Candidate must have completed all course work with CGPA of not less than 3.5 or 60% aggregate score in the M. Phil, M.Phil/Ph.D programme. (iv) Candidate must have fulfilled all other conditions as approved by the University Senate for admission into a Ph.D programme. 	3.3 <ul style="list-style-type: none"> (i) (ii) (iii) (iv)

Note: Candidate must obtain and complete Ph.D Conversion Form as appropriate.

3.2	Method of Application for Admission	3.4	Types of Admission
(i)	Candidates should process their application online at the University's website: www.futa.edu.ng , www.arcstee.org , and www.rectas.org using the e-tranzact method with payment made to the School of Postgraduate Studies' account.	3.4.1	Full-Time Admission
(ii)	Application forms for Postgraduate programmes are sold at an approved rate, excluding, bank charges.	(i)	Full-time admission shall be offered only to candidates who convince the School of Postgraduate Studies that they are not working or undertaking full-time studies in the University or elsewhere. In any case, a valid letter of release from the employer shall be required and verified. Candidates found to have made a false declaration in this regard shall be asked to withdraw from the University.
(iii)	Specifically, Ph. D candidates should send their Research Proposal to SPGS_ADMISSEIONS@futa.edu.ng using surname_School/Dept.doc e.g. Ojo_sosche.research proposal.	(ii)	
(iv)	Non-FUTA graduates should ensure that the official transcript from their Institutions is directed to the address below (indicating the target department) latest eight (8) weeks from the date of advertisement to the address below:	3.4.2	Part-Time Admission

NOTE: Mix-up in username and password by applicants would attract extra charges.

Error in completion and submission of forms during the process of application would lead to loss of application processing for the academic session (e.g. selecting M.Tech instead of PGD or Ph.D)

3.4.3	Full-Time Admission with Audited Courses
	Full-Time admission may be offered to candidates in Departments related to their course of study at undergraduate level. Such candidates will be required to audit some undergraduate courses to make-up for their deficiencies. The courses to be audited will be recommended by the Department and approved by the Academic Board of SPGS.

3.4.4 Admission of Full-Time Member of Staff

A full-time member of staff or any person engaged in academic work with the University or associated institutions may be admitted into a postgraduate programme, in accordance with the above regulations subject to the following modifications:

- (i) the staff member must meet the normal requirements for eligibility for admission into a programme of postgraduate studies in the area of his choice;
- (ii) notwithstanding other regulations relating to part-time study, Senate on the recommendation of the Board of the School of Postgraduate Studies, may prescribe a minimum period of study and research; where a member of staff who has been a candidate under these regulations ceases to be a member of staff of the University, the candidate shall apply to the Academic Board of the School of Postgraduate Studies, to determine the condition of continuance of candidature; and
- (iv) registered Postgraduate student should not hold any position that would compromise academic standard in the University.

3.5 Offer and Acceptance of Provisional Admission

The following conditions are related to admission and registration:

- (1) The offer of admission is strictly provisional and may be revoked if:
 - (a) you fail to formally accept the offer by paying the acceptance fee of N40,000.00 for M.Tech, M.Phil, M.Phil/PhD and PhD; and N10,000.00 for PGD within 2 weeks of notification of admission and other charges within three (3) weeks after payment of acceptance fee;
 - (b) you are unable to satisfy the necessary requirements for admission and registration; and
 - (c) you cannot produce at the time of registration, the original copies of your certificates, transcripts, NYSC Discharge Certificate and other academic credentials.
- (2) If you accept the offer, kindly follow the procedure for registration as stated on SPGS portal: spgs.futa.edu.ng.
- (3) You are to pick the screening form from the department and proceed to SPGS with the signed screening form for further screening procedures before payment of fees.
- (4) It is mandatory that you appear in person for clearance at the Admissions Office of the School of Postgraduate Studies latest a week before the date of matriculation which shall be announced. **Please note that the offer will be revoked and your slot given to someone else, if within six weeks from the date of the letter you have neither (i) completed and returned the printed acceptance forms nor (ii) submitted the originals of your credentials for clearance.**

(5) Payment of all fees must be made immediately, after completing screening exercise as provisional offer of admission may lapse thereafter.

(6) **It is mandatory to complete necessary procedures of registration into the session within three (3) weeks of the beginning of the academic session and renew your registration at the beginning of every session until you finally complete the programme. Late registration after the third week of commencement of the session (if permitted) will automatically attract penalty.**

(7) It is mandatory for all candidates to attend the Induction Programme and the Matriculation Ceremony as sanctions for not attending the Programmes may include withdrawal of admission, among other penalties. The date and venue will be announced later on the SPGS Portal, FUTA website.

(8) For International students, when applying for entry permit or visa, you may be requested to furnish the office of the Director-General, Federal Ministry of Internal Affairs, Abuja with the following items of information to accelerate the processing of your application.

- (a) Your nationality
- (b) Date and place of birth
- (c) Passport number, date and place of issue
- (d) Validity of passport
- (e) Anticipated length of stay at the Federal University of Technology, Akure
- (f) Sponsorship

It is important to note that a residence permit is necessary for the confirmation of an offer of admission. You may contact the Director, International Office of this University for further assistance (imosadeyi@futa.edu.ng; io@futa.edu.ng)

(9) The information on fees payable is available on SPGS Portal for your further action.

PLEASE NOTE:

- Acceptance fee, once paid, is not refundable.
- Please note that if it is discovered at any time that you do not possess any of the qualifications which you have listed to have obtained, the admission will be withdrawn immediately.

3.6 Deferment of Admission

In order to qualify for deferment of admission, students must;

- i) have the prerequisite qualifications for admission to the School/Department and course;
- ii) have paid all fees and be duly registered;
- iii) have been matriculated and assigned a matriculation number; and
- iv) apply and get a response on his application

It should be noted that every application shall be considered on its merit.

3.7 Admission by Transfer to the University	(b)	M.Phil./Ph.D
Admission by transfer into the University shall not normally be encouraged		(i) M.Phil/Ph.D programme shall be on Full-Time basis.
3.8 Program Duration/Validity Period		(ii) The duration for M.Phil/Ph.D. programme shall be 12 to 18 months and candidates who fail to meet the minimum requirement for conversion to Ph.D shall terminate the programme at the M.Phil level.
3.8.1 Postgraduate Diploma Programme		(iii) The final oral examination shall follow the same procedure as for the M.Phil oral examination.
(i). Department running PGD for:		Doctor of Philosophy (Ph.D) Programmes
(a) two semesters shall spend between 12 and 18 months;	3.8.4	Full-time students shall normally defend their theses between thirty-six (36) and forty eight (48) months, while
(b) three semesters shall spend between 18 and 24 months; and		Part-time candidates shall normally defend their theses between forty-eight (48) and sixty (60) months
(c) four semester shall spend between 24 and 36 months		At the expiration of 36 and 48 months full-time and part-time students respectively, the Academic Board of SPGS may, on behalf of Senate, approve extension of up to a maximum of twelve (12) months. At the expiration of the extension, a student is deemed to have forfeited the admission by losing his/her studentship.
(ii). Candidates whose studentship has expired under the regulations shall not be registered unless they have been granted waivers or extension (re-activation) as appropriate by the Academic Board of SPGS.		A Ph.D candidate shall be required to present an approved research proposal in the Department within six months after registration for full-time student; and within twelve (12) months for part-time students.
(iii). Candidates shall not be registered at the expiration of the extension granted by the Academic Board of SPGS.		
3.8.2 Masters' Programmes		3.8.5 Validity of studentship
(i). Full-time students shall normally spend between eighteen (18) and twenty-four (24) months.		Candidates whose studentship has expired under the regulations stated above shall not be allowed to register forthwith. The Secretary, SPGS shall compile the list of students whose studentship had expired at the beginning of every session. List of students whose studentship had expired shall be considered and approved by the Academic Board and ratified by the University Senate not later than two months at the beginning of every Session and communicate same to the affected students.
(ii). Part-time students shall normally spend between twenty-four (24) and thirty six (36) months.		
(iii). At the expiration of 18 and 24 months for full-time and part-time students respectively, the Academic Board of SPGS, on behalf of Senate may approve an extension of up to a maximum of six (6) months. At the expiration of the extension, such student is deemed to have forfeited the admission by losing his/her studentship.		CAVEAT: WHERE THERE IS/ARE CONFLICT(S) BETWEEN DEPARTMENTAL PUBLISHED RULES AND REGULATIONS GUIDING SPECIFIC PROGRAMME AND THE SENATE DECISION(S), THE SENATE DECISION WILL OVERRIDE THE DEPARTMENTAL RULES AND REGULATIONS.
3.8.3. M.Phil. & M.Phil./PhD Programmes		
(a) M.Phil		
(i) The Master of Philosophy Programme shall be a Full-Time programme.		
(ii) Students shall normally be required to spend between twelve (12) and eighteen (18) months.		
(iii) A candidate may transfer from M. Phil. to Ph.D programme after completing the course- work and fulfilling all other APPROVED requirements		

SECTION FOUR
REGISTRATIONS, MATRICULATION AND WITHDRAWAL FROM THE UNIVERSITY

4.1 Procedure for Registration Registration procedure shall be as announced through the SPGS portal at the beginning of every academic session	(ii)	Part-time student shall commence the process of thesis title registration after a minimum period of 42 months into the programme.
4.2 Late Registration Late registration shall be accepted only with the permission of the Dean, School of Postgraduate Studies and on the payment of the prescribed penalty fee which will be reviewed from time to time.	i)	Withdrawal from the University A student may be asked to withdraw: (a) if his/her academic performance is not satisfactory; (b) on grounds of ill-health; (c) on grounds of misconduct; and (d) failure to register as and when due A student may also voluntarily withdraw his/her studentship;
4.3 Matriculation and Induction Exercises The Matriculation Exercise and Induction for the Students of the School of Postgraduate Studies takes place about one month after registration, usually in line with approved academic calendar.	ii)	A student who fails to register for two consecutive semesters shall be deemed to have voluntarily withdrawn his/her studentship.
4.4 Verification of Results The verification of results of registered candidates shall be carried out before graduation from the programme	iv)	A student who fails to complete the programme within the approved duration of the programme of study shall be deemed to have voluntarily withdrawn his/her studentship.
4.5 Thesis Title Registration 4.5.1 Masters' Programmes Full-time student shall normally be required to commence the process of thesis title registration after a minimum period of 12 months into the Master degree programme.		Note: Please refer to duration of study for the relevant programme.
4.5.2 M.Phil. Programmes M.Phil. student shall normally be required to commence the process of thesis title registration after a minimum period of 12 months into the programme.		4.7 Request for Temporary withdrawal A student with genuine reason(s) may apply for temporary withdrawal for a maximum of one academic session. Such a student is expected to write to the Academic Board of Postgraduate School for approval. The period of temporary withdrawal shall not be counted for the period of study.
4.5.3 M.Phil./Ph.D Programmes M.Phil./Ph.D student who is unable to proceed to Ph.D programme shall normally be required to commence the process of thesis title registration after a minimum period of 12 months into the programme.		4.8 Request for Split Site Programme A student on split site programme shall inform the Academic Board of Postgraduate Studies on the duration of stay outside the University. The duration of stay shall count towards the award of the degree.
4.5.4 Doctor of Philosophy (Ph.D) Programmes (i) Full-time student shall commence the process of thesis title registration after a minimum period of 30 months into the programme.		

SECTION FIVE

POSTGRADUATE TEACHING, SUPERVISION AND EXAMINATIONS

- 5.1.** **Eligibility to Teach Postgraduate Courses** (viii) Only the following categories of staff shall normally be eligible to teach postgraduate courses:
- (a) Persons with a doctorate degree and with a minimum of one year of teaching and research experience (Lecturer II) at the University or Research Institute,
 - (b) In particular for postgraduate diploma programme, Lecturers with a good first degree and master's degree with research and teaching experience and NOT lower than Assistant Lecturer grade, provided he/she is not a Postgraduate student in the University can teach Postgraduate Diploma courses.
- (ii). In pursuance of Regulation 5.1(i) above, each SPGAC shall on recommendation of the appropriate Department, submit for approval of the Board at the beginning of each academic session, the list of eligible staff to teach postgraduate courses (Masters, M.Phil and PGD programme separately).
- (iii). The Board in pursuant to relevant Regulation, may refuse to approve course (s) of study if it is convinced that the available teaching staff is inadequate under the regulations.
- 5.2** **Supervision of Master's Dissertation and Doctoral Thesis**
- 5.2.1** **Eligibility to Supervise Master Dissertation and Doctoral Thesis**
- (i) Professors in relevant fields.
 - (ii) Senior Lecturers and above, with Ph.D can be major supervisors for Master's dissertation and Ph.D thesis
 - (iii) Lecturer I with Ph.D or Lecturer II with Ph.D plus three (3) years post-qualification teaching experience can co-supervise Ph.D and be major supervisor for Master's dissertation.
 - (iv) All major supervisors shall be staff of the department who specializes in the area of the research interest of the student.
 - (v) In case a student from the University has an external supervisor, such supervisor must be acquainted with the University's regulation on details including duration of its postgraduate programmes.
 - (vi) All co-supervisors appointed from Research institute/ Industries shall have a minium of 2 years post Ph.D experience .
 - (vii) For supervision of master's dissertation, a co-supervisor is recommended to further strengthen the quality of the thesis.
- (ix) Where a recommended Co-Supervisor is from another University/research institute/industry, the Head of Department shall normally seek the approval of the Academic Board of Postgraduate Studies for the appointment of such Co-Supervisor. Normally, for a Ph.D candidate there shall be at least one Co-Supervisor for the student. The Co-Supervisor(s) should be in relevant fields to the student's research and may come from other departments in the School or from other Schools in the University or from another University.
- 5.2.2**
- (i)
 - (ii)
- Roles of Supervisors**
- The supervisors shall advise and train the candidate in the research methods and guide him/her in writing his/her project report or thesis.
- Request to change supervisor(s):
- (a) Any request for change of supervisor originating from the Department, must be made in writing. Such request shall normally be addressed to the Dean, School of Postgraduate Studies and routed through the appropriate Departmental and School Postgraduate Advisory Committee.
 - (b) In a case where the supervisor is the Head of Department, the candidate shall route his/her request through the Chairman of the School Postgraduate Advisory Committee to the Dean, SPGS.
 - (c) Where the major supervisor has disengaged from the services of the University, the departmental Postgraduate committee shall recommend a new major supervisor for the student to the Academic Board of Postgraduate Studies through the Dean,SPGS.
 - (d) Where the disengaged major supervisor has been offered appointment as Adjunct supervisor (contract staff, Adjunct Professor/ Lecturer) in the University, the procedure in (c) above shall be followed for approval in order to continue as major supervisor. The Adjunct Supervisor shall be entitled to the approved supervision honorarium per session.
 - (e) In a case where the major supervisor is on leave of absence from the University for a period exceeding 12 calendar months, the Postgraduate Departmental Committee shall shall recommend a new major supervisor for the student to the Academic Board of Postgraduate Studies through the Dean,SPGS.

- (e) A supervisor shall not be changed unless due processes are followed as specified above.
- ii. M.Phil/Ph.D grade shall be 55-59.9% or 2.4 – 2.99 CGPA on a 5.0-point grading system.
- iii. The Ph. D grade shall be minimum of 60% or 3.50 CGPA.

5.3 Mode of Examinations

- (i) Courses shall be assessed by means of oral/practical and written examination(s) as may be specified.
- (ii) No candidate shall be permitted to sit for the prescribed examination(s) until such candidate has:
 - (a) appropriately registered for the course (s) leading to the examinations, and paid all prescribed fees for the course(s),
 - (b) satisfied the minimum attendance of 65 percent of lectures in each course, and
 - (c) satisfactorily fulfilled all other approved University, School or Departmental requirements for the programme of study.

5.3.1 Approved Grading System

Pass mark for all Postgraduate programmes shall be 50% with effect from 2015/2016 academic session without prejudice to those who are already running their postgraduate programmes. The approved grading system is as follows:

(i) CGPA Grading System

4.5	-	5.00
3.50	-	4.49
2.40	-	3.49
1.50	-	2.39
1.00	-	1.49
< 1.00	-	0

(ii) Percentage Grading System

70% and above

65%	-	69%
60%	-	64%
55%	-	59%
50%	-	54%
0 %	-	49%

Note: This is to start from the set of students that would be admitted in 2016/2017 academic session.

This grading system will not be applicable to students that graduated from FUTA prior to the commencement of the new grading system.

The transcript shall indicate the qualification of the grade whether candidate is qualified to proceed on higher degree or not.

(iii) Revised Classification of Master's Grades from 2016/2017 Academic Session

The Master's grade shall be classified to make it specific. It will be classified as follows:

- i. M. Phil grade shall be 50 – 54.9% or 1.5 – 2.39 CGPA on a 5.0 grading system.

5.3.2 Board of Examiners

- (i) For each programme, there shall be a Board of Examiners consisting of:
 - (a) The Head of Department, who shall be the Chairman and Chief Examiner, and
 - (b) Examiners for each course.
- (ii) The result of the examination for each semester shall be submitted by the appropriate Department to the Academic Board of School of Postgraduate Studies for recommendation to Senate for approval not later than four (4) weeks after the Semester Examinations.

5.3.3 Examinations and Examiners

All students shall take and pass the prescribed examinations at the end of the first and second semesters.

- (i) For PGD Project Report defense, the Panel of Examiners shall consist of:
 - (a) the Head of the Department who shall be Chief Examiner and Chairman of the panel;
 - (b) Departmental PGD Coordinator; and
 - (c) an External Examiner
- (ii) For the M. Agric. Tech., M.TecM., M. Arch., M. Eng., M.Phil., and M. Phil./Ph.D thesis, the Panel of Examiners shall consist of:
 - (a) the Head of Department who shall be Chief Examiner and Chairman of the panel;
 - (b) the candidate's supervisor(s);
 - (c) Representative of the Academic Board of School of Postgraduate Studies;
 - (d) Sub Dean (masters) who reads the guidelines for the conduct of the examination; and
 - (e) an External Examiner.
- (iii) For the Ph.D programme, the Panel of Examiners shall consist of:
 - (a) the Head of Department who shall be the Chief Examiner and the Chairman of the Panel;
 - (b) the candidate's supervisors (minimum of two - a major and at least one co-supervisor)
 - (c) at least one person representing the Academic Board of School of Postgraduate Studies;
 - (d) Sub Dean (Ph.D) who reads the guidelines for the conduct of the examination; and
 - (e) an External Examiner.
 - (f) In a case where the chief examiner is one of the candidate's supervisor, the ABPGS shall appoint other school examiner for the candidate.
- (iv) Appointment of External Examiners
 - (a) The supervisors (major and Co) shall normally nominate two external examiners: One substantive and the other alternate for approval of Senate through the ABPGS.

- (b) Any external examiner must not be a staff of the University and, in case he/she has been on sabbatical in the University, must have two years post sabbatical experience.
- (c) The external examiner should be in the relevant area of the research work.
- (d) The two nominated examiners should not be from the same University
- (iii) only the Panel of Examiners, led by the External Examiner, shall pose questions to the candidate; the period to be spent on the Question and Answer Session shall be at the discretion of the Panel of Examiners;
- (iv)
- (v) based on the presentation, the External Examiner shall moderate the comments and interactions segment within twenty minutes;
- (vi) at the end of the Question and Answer Session, the invitees shall leave the examination venue;
- (vii) the Panel of Examiners shall examine the thesis and point out the corrections to be made to the candidate (where applicable);
- (viii) the candidate shall leave the examination venue, while the Panel of Examiners deliberate and take its decision on the performance of the candidate;
- (ix) the candidate and the available invitees shall come back into the examination venue and the result of the Oral Examination shall be announced publicly; and the Examiners' Report shall be forwarded to the School of Postgraduate Studies by its representative within two (2) working days.
- (x)
- (xi) For master's oral examination, at the discretion of the External Examiner, the candidate can make use of visual presentation with audio visual aids. The candidate shall however be informed ahead.
- (xii) For M.Phil and M.Phil./Ph.D oral examination, the candidate shall make use of visual presentation with audio visual aids.

5.3.4 Open Examination of Thesis

5.3.4.1 Audience

Open examination of thesis shall be applicable to Ph.D programme only. The following categories of persons and agencies should be invited to the examination venue:

- (i) members of the Panel of Examiners approved by Senate.
- (ii) lecturers in the candidate's Department and the University community;
- (iii) Postgraduate students in the candidate's Department;
- (iv) all stakeholders including members of the University community and related agencies outside the University.

5.3.4.2 Conduct of the Examination

- (i) there, shall be visual presentation with audio visual aids;
- (ii) a candidate shall spend not more than thirty (30) minutes to make his/her presentation;

5.3.4.3 Examiners' Report for the Degree of M.Tech, Mphil, Mphil/Ph.D and Ph.D

The template of Examiners' report for the degree of M.Tech., M.Phil, M.Phil/Ph.D and Ph.D is as presented below:

THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE



Form PGS/ER/2017

SCHOOL OF POSTGRADUATE STUDIES EXAMINERS' REPORT FOR THE DEGREE OF M.TECH, MPHIL, MPHIL/PHD AND PHD

Part A - General Information

1. Surname of Candidate:.....
(in block letters)
2. Other Names in Full:.....
3. Matriculation Number:.....
4. Faculty:.....
5. Department:.....
6. Degree in View:.....
7. Date of First Registration (dd/mm/yyyy):.....
8. Extension with Date(s) (Attach Letters of Approval):
.....
9. Title of Thesis:.....

PART B - Course Work (if applicable)

10. Results:.....
11. Remarks:.....

PART C - Thesis Evaluation

Excellent = 5; Very Good = 4; Good = 3; Fair 2; Poor =1; Very Poor =0

Numbering	Criteria	Score	Comments (if any)
A	Abstract		
	• Appropriate (Well written)		
	Sub-Total (5 marks maximum):		
B	Formulation/Statement of the Problem(s)/ Rationale/ Justification		
	• Well written		
	Sub-Total (5 marks maximum):		
C	Research goal/Hypotheses/Question(s)		
	• Well stated and Relevant		
	Sub-Total (5 marks maximum):		
D	Aim(s)/Objective(s)/Purposes(s)		
	• Clear and Relevant		
	• Achievable		
	Sub-Total (5 marks maximum):		
E	Literature Review		
	• Relevant and Current		
	• Authoritative source		
	• Correct interpretation		
	• Critical appraisal of literature		
	• postulation Appropriate theoretical /conceptual framework		
	Sub-Total (5 marks maximum):		
F	Research Methodology		
	• Logically derived from objective(s)		
	• Appropriate choice of design		
	• Relevant research instrument(s)		
	• Relevant Method of Data Collection		
	Sub-Total (5 marks maximum):		
G	Results		
	• Accurate Data Analysis		
	• Accurate Interpretation of analyzed Data		
	• Findings Well Identified/Engineering Design Considerations		
	Sub-Total (5 marks maximum):		
H	Discussion and Conclusions		
	• Clear Discussion and Logical Comments		
	• Discussion connected to the Literature		
	• Proper conclusions drawn		
	• Conclusions substantiated		
	• Contributions to Knowledge and Implication for scholarship identified		
	Sub-Total (5 marks maximum):		

Numbering	Criteria	Score	Comments (if any)
I	Recommendations		
	<ul style="list-style-type: none"> • Relevance to the significance/rationale of the study • Relevance to research findings • Suggestion for further research (relevance to the limitations/scope of the study) 		
	Sub-Total (5 marks maximum):		
J	Structure, Language and Style of Thesis		
	<ul style="list-style-type: none"> • Logical Organization of Ideas • Correct grammar • Scientific/academic style • Clarity of ideas 		
	Sub-Total (5 marks maximum):		
K	Referencing/Bibliographic Method		
	<ul style="list-style-type: none"> • Appropriate citation within the text 		
	Sub-Total (5 marks maximum):		
L	Originality, Creativity and Publishability		
	<ul style="list-style-type: none"> • Responsibility for Statement • Problem solving/Value adding contributions • Publishability of the findings as identified in the thesis 		
	Sub-Total (5 marks maximum):		
	Total for Part C(60 marks)		

Part D – Student’s Oral Presentation

S/N	Criteria	Score	Comments (if any)
1.	Comportment		
2.	Composure		
3.	Student’s ability to communicate his/her subject and to defend the research appropriately		
4.	Evidence of original and critical thought, depth and breadth of knowledge to the field of study		
5.	General knowledge of the subject matter		
6.	Candidate’s expertise with respect to relevant methodologies and techniques		
7.	Student’s response to questions		
	Sub-Total for Part D 40 marks		

Total Marks Obtainable: 100

Part E - Recommendation

Contribution of the work to knowledge and scholarship:

To receive Recommendation (A):

Student must score 80-100, (B): 70-79, (C): 65-69, (D): 60-64, (E): 55-59, (F): 50-54, (G): 0-49

(A) Accepted with Distinction

A thesis accepted with distinction when all or most of the research findings have either been published or accepted for publication in citation-indexed journals, and requires minimal improvements in language only.

(B) Accepted with Minor Modification

A thesis accepted with minor modifications if it requires any of the following: reformatting of chapters, revision of literature, improvement in the declaration of research objectives or statements, insertion of missing references, amendment of inaccurately cited references, and other minor improvements including language.

(C) Accepted with Major Modification

A thesis is accepted with major modifications if it requires any of the following *but not additional experimental work or data collection*: extensive revision of the entire thesis to improve quality such as major improvement in description of methodology, statistical re-analysis of research data, removal of research chapter(s), and re-discussion of the results, including improvements in language.

The examiner may recommend that the student seek the assistance of an editing service if language errors are extensive.

(D) Oral Re-examination (Re-viva voce)

A thesis can be recommended for a second and final oral re-examination (re-viva voce) to be conducted within sixty (60) days after the date of the first viva voce.

(E) Re-submission of Thesis

A thesis should be recommended for re-submission if it does not meet the scope of the degree for which it is intended, the objectives of the research are not met and/or when there are obvious flaws in the experimental design and /or methodology, and therefore, *requires additional experimental work or data collection*.

(F) Re-submission of a Masters Thesis

A thesis can be recommended for re-submission to be accepted for the award of a Masters degree if the thesis does not meet the scope of a doctoral thesis but is adequate for a Masters degree. All amendments recommended by the Thesis Examination Committee must be made and the thesis resubmitted to the School for examination as a Masters thesis within 60 days of the viva voce.

(G) Rejection of Thesis (Fail)

A 'Fail' status is given if the thesis fails to meet the requirements of a PhD or Masters academic level or found to have been plagiarized.

Panel's Comments:

Panel's Recommendation for the Award of degree:

Yes

No

Names and Signatures of Examiners:

S/N	DESIGNATION	NAME	SIGNATURE	DATE
a.	Chief Examiner			
b.	Major Supervisor			
c.	Co-Supervisor: (i) (ii)			
d.	Other School Examiners: (i) (ii)			
e.	Representative of SPGS			
f.	External Examiner(s)			

SECTION FIVE

PRESENTATION OF THESIS/DISSERTATION/PROJECT REPORT

The standard format for the thesis/dissertation/project report to be submitted to the School of Postgraduate Studies shall be as follows:

- 6.1. The Cover of the Thesis/Dissertation/Report**
- i. The colour shall be deep purple for all Postgraduate programme Reports, Dissertations and Theses.
 - ii. The titles of the Reports, Dissertations and Theses shall be written in full capital letters including biological name, but the latter name (shall be italicized).
 - iii. The name of the candidate shall be written in full: surname first, followed by other names.
 - iv. The year of defense shall be written at the bottom right corner on the cover.
 - v. The spine shall bear (from bottom to top side) the surname and initials of the candidate, the programme and year of the submission of the research/thesis.
 - vi. Candidate is required to submit two bound and electronic (PDF format) copies to the SPGS
 - vii. Recommended font type and size is as specified below:
 - Font type Times Roman
 - Font Size 12
 - Spacing Double line
 - Justification Paragraphing style
 - viii. The sample of the cover of the Report/ Dissertation / Thesis should be in the format shown in Fig.1:

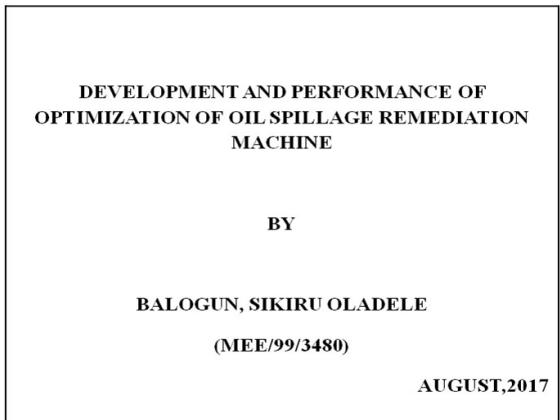


Fig. 1: The sample of the cover of Thesis/ Dissertation/Report

6.2. Title Page

- i. The titles of the theses and names of candidates shall be written as on the cover.
- ii. The candidate's previous degree(s) and matriculation number shall come under the names.

On the same page, under the name, the following shall also be written:

A thesis in the Department of, School of submitted to the School of Postgraduate Studies, in partial fulfillment of the requirements for the award of in of the Federal University of Technology, Akure, Nigeria (see Fig. 2).

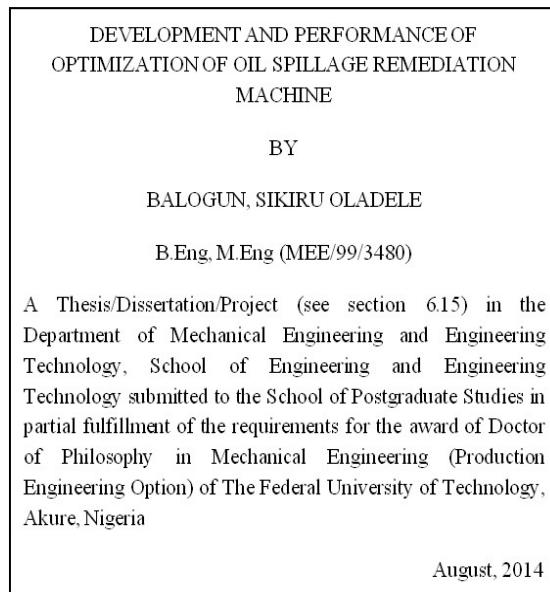


Fig. 2: Title Page

6.3. Declaration Page

The Declaration Page contains a statement by the student on the originality of the work reported in the Thesis/ Dissertation/Project and acknowledgement of sources of information utilized, according to the format below (see Fig. 3).

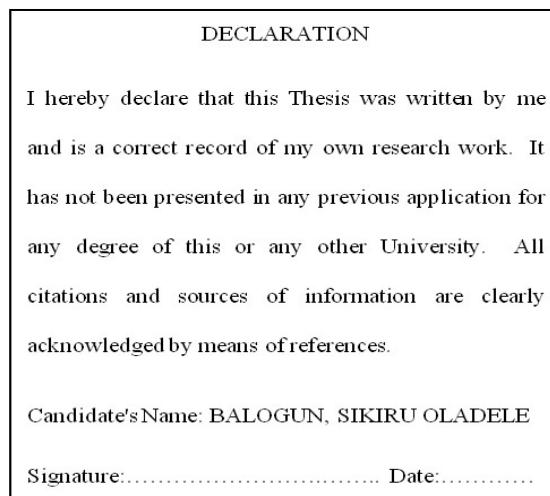


Fig. 3: Samole of Declaration by Student

I hereby declare that this Thesis/Dissertation/ Project was written by me and is a correct record of my own research work. It has not been presented in any previous application for any degree of this or any other University. All citations and sources of information are clearly acknowledged by means of references

Candidate's Name:
Signature: Date:

6.4. Certification page

The Certification Page contains a statement of approval of the Thesis/Dissertation/Project in line with the appropriate University regulations and is signed by the Major Supervisor and Co-Supervisors according to the following and as shown in Fig. 4

We certify that this Thesis/Dissertation/Project entitled “.....” is the outcome of the research carried out by in the Department ofof the Federal University of Technology, Akure.

Major Supervisor's Name:.....

Signature: Date:

Co- Supervisor's Name:

Signature: Date:

Co- Supervisor's Name:.....

Signature: Date:

***NOTE: Where there is an external supervisor, the external supervisor if available at the oral examination shall be a signatory on the certification page.**

CERTIFICATION	
We certify that this Thesis/Dissertation/Project entitled “Development and Performance of Optimization of Oil Spillage Remediation Machine” is the outcome of the research carried out by Balogun, Sikiru Oladele in the Department of Mechanical Engineering, The Federal University of Technology, Akure.	
Major Supervisor's Name:.....	
Signature: Date:
Co- Supervisor's Name:	
Signature: Date:
Co- Supervisor's Name:.....	
Signature: Date:

Fig. 4: Certification Page

6.5. Acknowledgment Page

The acknowledgement page is for giving credit to all those who played significant roles in support of the study or the student during the course of study, research and write-up (see Fig. 5).

ACKNOWLEDGEMENTS
I am grateful to my Major Supervisor, Dr. his encouragement and constructive criticism throughout the conduct of this research. My sincere gratitude also goes to

Fig. 5: Sample of Acknowledgements

6.6. Dedication Page

The Dedication is optional and could come after the Acknowledgement page. It should generally be short in length and convey the message in a concise manner. See Fig. 6 for sample.

DEDICATION
This Thesis/Dissertation/Project is dedicated to my aunt, Madam , for her love and encouragement at all times and without whose financial support this study would not have been possible

Fig. 6: Sample of Dedication Page

6.7. Abstract

Each Thesis/Dissertation/Project is expected to contain an abstract of not more than 500 words displayed immediately after the Certification page. This should report in a concise manner the objectives of the research, the method, findings and conclusions. It should be in a form suitable for direct use by international abstracting services and should not be paragraphed.

6.8. Table of Contents

The Table of Contents is very important as it provides an insight into the organization of the whole Thesis/Dissertation/ Project. It should therefore be carefully compiled. To aid quick comprehension, listing of sub-sections should be indented from sections as shown in Fig.7.

6.9. List of Tables

All the tables in the Thesis/Dissertation/Project must be serially numbered and a table compiled to show their page location within the text as indicated in Fig. 8.

6.10 List of Figures

All the figures in the Thesis/Dissertation/Project must be serially numbered and a table compiled to show their page location within the text as indicated in Fig. 9.

TABLE OF CONTENTS	
Content	Page
Title Page	i
Declaration	ii
Certification	iii
Abstract	iv
Dedication	v
Acknowledgements	vi
Table of Contents	vii
List of Tables	viii
List of Figures	ix
CHAPTER ONE	1
1. INTRODUCTION	1
CHAPTER TWO	2
2.0 LITERATURE REVIEW	2
2.1 Status of aquatic system and its resources	3
2.2 Length-weight relationship	25
CHAPTER THREE	26
3.0 MATERIALS AND METHODS	26
3.1 Description of study area	26
CHAPTER FOUR	28
4.0 RESULTS	28
4.1 Effect of Environmental Factors	28
4.2 Estimate of Environmental Correlation	42
CHAPTER FIVE	60
5.0 DISCUSSION	60
5.1. Conclusions and Recommendation	60
REFERENCES	105
APPENDICES	106

Fig. 7: Sample of Table of Contents

LIST OF TABLES		
Table		Page
1.	Range ofLiterature	8
2.	Estimates offrom literature	15
3.	Summary of analyses of environmental effects	45

Fig. 8: Sample of List of Tables

LIST OF TABLES		
Table		Page
1.	Range ofLiterature	8
2.	Estimates offrom literature	15
3.	Summary of analyses of environmental effects	45

Fig. 9: Sample of List of Figures

6.11 List of Plates

All the figures in the Thesis/Dissertation/Project must be serially numbered and a table compiled to show their page location within the text as indicated in Fig. 10:

LIST OF PLATES		
Plate		Page
1.	Photomicrograph of.....	18
2.	Maize of different	60

Fig. 10: Sample of List of Plates

6.12 Outline of Thesis/Dissertation/Project

The following two options (A and B) shall be the outline of thesis/dissertations:

6.12.1. Option A

- Chapter One:Introduction
 - Chapter Two: Literature Review
 - Chapter Three: Materials and Methods/
Methodology
 - Chapter Four: Results
 - Chapter Five: Discussion
 - Chapter Six: Conclusion and Recommendations
- NOTE: Reference List shall follow immediately after Chapter Six. Then the appendices can follow.**

6.12.2. Option B

The following shall be the outline of thesis/dissertations:

- Chapter One: Introduction
- Chapter Two: Literature Review
- Chapter Three: Materials and Methods/
Methodology
- Chapter Four: Results and Discussion
- Chapter Five: Conclusion and Recommendations

NOTE: Reference List shall follow immediately after Chapter Five. Then the appendices can follow

6.13 Appendix When appendices are included in the thesis/dissertation/project, they should also be numbered serially and a table compiled to show their page location within the text. Unless references are made to them in the body of the work, appendices may not be necessary.	6.17 Standard and Presentation of Thesis/Dissertation/Project (i) In accordance with Regulation 5.2.2(i), a thesis/dissertation/project shall be prepared under the direction of a supervisor(s) nominated by the Departmental Postgraduate Committee for the approval of the Academic Board. (ii) The thesis/dissertation/project must be a connected piece of work which may comprise a series of chapters on related topics, provided that these are accompanied by an adequate explanation of their relationship to each other and to the wider context of the subject. (iii) A candidate may not include in the thesis/dissertation/project any material presented in fulfillment of the requirements for any other degree or professional qualification in this or another University (iv) A thesis/dissertation/project must be the candidate's original contribution to knowledge or to practice in the candidate's field. (v) Every thesis shall be written in English Language.
6.14 Originality of Thesis/Dissertation/Project The thesis/dissertation/project of a candidate may not include materials already submitted for the award of a degree in any other University, and shall not be part of a previous thesis/dissertation/project for a higher degree of the Federal University of Technology, Akure.	
A candidate shall not be qualified for the award of a Postgraduate Diploma, Masters or Doctorate Degree until he has passed all the prescribed courses (where applicable), submitted a satisfactory thesis/dissertation/project, passed his oral examination and spent not less than the minimum number nor more than the maximum number of semesters as stipulated for the programme.	
6.15 Nomenclature of Research Reports In The Federal University of Technology, Akure, the nomenclature for Postgraduate Diploma, Masters and Ph.D research treatises shall be Project, Dissertation and Thesis respectively.	6.18 Format of Spine Title The title on the cover spine should consist of the degree with the specialization in brackets, followed by the student's initials and surname and year of thesis/dissertation/project defense, as shown in Fig.11.
6.16 Preparation of Thesis/Dissertation/Project In preparing Thesis/Dissertation/Project, students should take note of the following: (i) The title of the Thesis/Dissertation/Project should not be more than 18 words. (ii) The abstract should not be more than 500 words and should not be paragraphed. (iii) Every table, figure and plate must come immediately after it is mentioned on the next page; and there must be one table/figure/plate per page. Title of Table should be at the top of the table while title of figures and plate should be at their bottom. (iv) Tables/figures/plates must be numbered on chapter basis continuously e.g. Table 1.1, Table 1.2,etc for tables in Chapter 1 and Table 2.1, Table 2.2, etc for tables in Chapter 2, etc. (v) Tables/figures/plates are not to be cited in the discussion. (vi) In situations where structural formulae are required, they shall not be denoted as Figures and thus can appear between adjoining paragraphs. (vii) All plates (photographs) shall be printed in full colour except in cases where that negates the information being provided. (viii) Tables must be simple and understandable. There shall not be cross lines or shading within the table.	Ph.D (PHYSICS) P. K. OLAOLUWA, 2020

Fig.11: Format of the Spine of the Thesis/Dissertation/Project

6.19 General Notes

6. 6.19.1 Typing, margins, line spacing, paging, type and size of paper.

The body of the Thesis/Dissertation/Project should be typed double-spaced on one side of the paper only. The paper should be white, 75-90 gram and A4 sized (210 – 297 mm). The character-set used for typing should preferably be Times New Roman font of size 12pt. Typing should be in black ink. A margin of 2.5 cm should be left all round except on the left margin which should be 3.75 cm wide as shown in Fig.12:

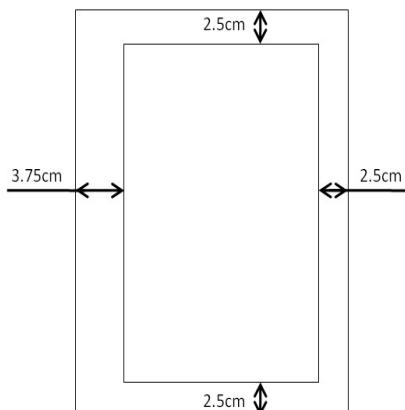


Fig. 12: Sample of Typing, Line Spacing, Paging, Type and Size of Paper

6.19.2 Page Numbering

All pages of the Thesis/Dissertation/Project should carry page numbers centred within the bottom margin of the page. The prefatory pages should be numbered using Roman numerals (I, II.... IX). All pages of the main text of the Thesis/Dissertation/Project starting with the Introduction (Chapter One) should be consecutively numbered with Arabic numerals (1, 2..... 250).

Typing of the Thesis/Dissertation/Project should be done using an electronic computer and the printing should preferably be by laser-jet printer.

6.20 Authentication of Thesis/Dissertation/Project

Each copy of the thesis/dissertation/project has to be authenticated and accepted by the Postgraduate School through the fixation of a Label duly signed and sealed to the reverse side of the cover page. See Figs.13 and 14.

THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE, NIGERIA	
...LOGO...	
THIS PROJECT SUBMITTED BY	
<hr/> was accepted in Partial Fulfillment of the Requirements for the Degree of	
<hr/> <i>of this University</i> <hr/>	
THE DATE OF AWARD IS	
<hr/>	
Postgraduate School	Date

Fig. 13: Sample of Authentication of Project

THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE, NIGERIA	
...LOGO...	
THIS DISSERTATION/THESIS SUBMITTED BY	
<hr/> was accepted in Partial Fulfillment of the Requirements for the Degree of	
<hr/> <i>of this University</i> <hr/>	
THE DATE OF AWARD IS	
<hr/>	
Postgraduate School	Date

Fig. 14: Sample of Authentication of Dissertation/Thesis

SECTION SEVEN
GENERAL REGULATIONS GOVERNING SPECIFIC POSTGRADUATE PROGRAMMES

7.0	Offences and Penalties		
7.1	Examination Offences and Penalties		
7.1.1	<i>Misconduct before Examination</i>		
(i).	Misconduct: Involvement in and bearing responsibility for examination question leakage.	(viii)	Penalty: Suspension for two (2) semesters Misconduct: Giving, or receiving, or in any way benefiting from information relating to a course in an examination through electronic, personal dress material, part of the body in any manner or form whatsoever.
(ii).	Misconduct: Participating in or benefiting from question leakage	(ix).	Penalty: Suspension for two (2) semesters Misconduct: Leaving the examination hall without the permission of the invigilator
(iii).	Misconduct: Attempting to participate in and/or benefit from examination question leakage.		Penalty: Letter of warning. In addition, the candidate shall be scored 0(F) in the course examined.
(iv).	Penalty: Suspension for two (2) semesters Misconduct: Coming into the examination hall within thirty (30) minutes of the commencement of an examination	(x).	Misconduct: Leaving the examination hall with examination material before the end of the examination without the permission of the Invigilator
	Penalty: The candidate shall be allowed into the examination hall but he/she shall not be given extra time.	(xi).	Penalty: Suspension for two (2) semesters. Misconduct: Substituting or exchanging the answer script given to a candidate in whatever manner or form, during the examination.
(v).	Misconduct: Coming into the examination hall later than thirty (30) minutes after the commencement of an examination.	(xii).	Penalty: Expulsion of all the students involved from the University. Misconduct: Exhibiting insulting, rude, impolite behaviour to another student during the course of an examination.
	Penalty: The candidate shall not be allowed into examination hall and he/she shall be scored 0 (F) in the course examined.	(xiii).	Penalty: Letter of warning Misconduct: Exhibiting insulting, rude, impolite behaviour to a staff during the course of an examination
7.1.2	<i>Misconduct during Examinations</i>		Penalty: Suspension for two (2) semesters. Misconduct: Physical assault on another student during the course of an examination.
(i).	Misconduct:Sitting for an examination for which a candidate did not register for or qualified to sit for.	(xiv).	Penalty: Suspension for two (2) semesters Misconduct: Physical assault or battery on staff during the course of an examination.
	Penalty: The result of the candidate in the course shall be nullified. He/She shall be scored 0(F) and be issued a letter of warning.	(xx).	Penalty: Expulsion from the University Misconduct: Talking to or communicating with another candidate without due Permission during the course of an examination
(ii).	Misconduct: Representing/standing in for another candidate in the course of an examination.	(xxi).	Penalty: Letter of warning Misconduct: Bringing in unauthorized materials(s) into the examination hall by a candidate without proven evidence of using the material(s)
(iii).	Penalty: Expulsion from the University. Misconduct: Conniving with another candidate/student/person to represent/stand in for another candidate in an examination	(xxii).	Penalty: Suspension for one (1) semester. The candidate shall also be scored 0(F) in the course Misconduct: Bringing in unauthorized material(s) into the examination hall by a candidate with proven evidence of using the material(s) or any part thereof.
(iv).	Misconduct: Destroying, effacing, mutilating, swallowing of potentially incriminating material relating to a course during the course of an examination.	(xxiii).	Penalty: Suspension for two (2) semesters. In addition, the candidate shall be scored 0(F) in the course.
(vi).	Penalty: Suspension for two (2) semesters. Misconduct: Displaying of inappropriate or anti-social behaviour (e.g. smoking, singing, cat calls, etc) capable of causing delay and/or disruption of an examination process.	(xxiv).	Penalty: Suspension for two (s) semester. The candidate shall also be scored 0(F) in the course.
(vii).	Penalty: Suspension for two (2) semesters Misconduct: Displaying of inappropriate or anti-social behaviour leading to disruption and suspension of an examination.		Misconduct: Failure by a candidate to submit his/her answer script after taking part in an examination.

	Penalty: Suspension for two (2) academic semesters. In addition, the candidate shall be scored 0(F) in the course.	7.3	Behaviour/Misconduct Off-Campus. Misconduct: Insulting, rude, impolite behaviour on another student outside the University premises Penalty: Letter of warning Misconduct: Physical assault or battery on another student outside the University premises
(xxv).	Misconduct: Giving/receiving irregular assistance, cheating or aiding and abetting by a candidate/student in an examination. Penalty: Suspension for two (2) semesters.	(ii).	Penalty: Expulsion from the University
(xxvi).	Misconduct: Refusal to sign the Attendance Register during examination Penalty: Warning	(iii).	Penalty: Suspension for two (2) semesters Misconduct: Physical assault or battery on staff outside the University premises
	7.1.3 Misconduct after Examination	(iv).	Penalty: Expulsion from the University.
(i).	Misconduct: Involvement in an attempt to substitute or change or remove or effect changes in examination script(s), record sheet(s), attendance register or any examination related material/document.	7.4	Misellaneous Offences Misconduct: Obstruction of motorways on-campus or off-campus during or after regular school hours.
(ii).	Penalty: Expulsion from the University Misconduct: Gentle/Subtle exertion of influence with a view to obtaining undue advantage in the grading of scripts or award of marks on an internal or external examiner.	(ii).	Penalty: Letter of warning Misconduct: Riotous behaviour on-campus or off-campus, in Bus/Taxi Cabs, Bus stops, in the Hostel or Classroom. Refusal to pay Bus/Taxi fare on campus or off campus.
(iii).	Penalty: Letter of warning Misconduct: Non-gentle/Non-subtle exertion of influence with a view to obtaining undue advantage in the grading of scripts or award of marks by an internal or external examiner.	(iii).	Penalty: Suspension for one (1) semester. Misconduct: Worshipping or holding religious activities in unauthorized, unapproved places, day or night on campus premises.
	Penalty: Expulsion from the University	(iv).	Penalty: Letter of warning Misconduct: Luring/imprisoning falsely a fellow student or a member of staff against his or her wish
7.2.	Misconduct on-Campus		Penalty: Expulsion from the University Misconduct: Indecent assault of a female or male or forceful unsolicited sex of another student.
(i).	Misconduct: Display of inappropriate or anti-social behaviour (e.g. Smoking, Singing, Cat call, etc) capable of causing delay or disruption of class work, tutorials, lectures, laboratory work etc.	(v)	Penalty: Expulsion from the University
(ii).	Penalty: Suspension for one (1) semester. Misconduct: Display of inappropriate or anti-social behaviour (e.g. Smoking, Singing, Cat call etc) capable of causing delay or disruption leading to suspension of school activities (class work, tutorial, lecture, etc)	(vi).	Misconduct: Sexual harassment of staff by student
(iii).	Penalty: Suspension for two (2) semesters Misconduct: Physical assault or battery on staff in the Departmental or General Offices Penalty: Expulsion from the University	(vii).	Penalty: Expulsion from the University Misconduct: Chanting war songs or shouting of slogans by students or group of organized students anywhere on campus or off-campus with an intention to cause disruption to University activities.
(iv).	Penalty: Student shall pay cost of replacement, and be suspended for one (1) semester. Misconduct: Non-willful damage to any University property or staff and student property.	(viii).	Penalty: Suspension for one(1) semester. Misconduct: Unsolicited illegal entry of a male student into the female hostel and vice-versa
(v).	Penalty: Student shall pay cost of replacement Misconduct: Physical assault or battery on a member of the community within the University premises. Penalty: Expulsion from the University	(ix).	Penalty: Letter of warning Misconduct: Removal of minor personal items and/or articles from public places.
		(x).	Penalty: Student shall pay cost of replacement of the item or article and be suspended for two (2) semesters. Misconduct: Fraud, advance fee fraud, embezzlement by any student or group of students.
			Penalty: Such student(s) shall be sanctioned as appropriate under the University enabling laws subject to the operating laws in the country.

- (xi). Misconduct: Student/candidate who had been issued a letter of warning on account of examination misconduct or other culpable or blameworthy act and was subsequently found culpable of any other blameworthy act or examination misconduct.
- Penalty: Suspension for one (1) semester.**
- (xii). Misconduct: A student/candidate who had been suspended for one semester on account of examination malpractice or other offence and was subsequently found culpable of any other blameworthy act or examination misconduct.
- Penalty: Suspension for two (2) semesters.**
- (xiii). Misconduct: A student/candidate who had been suspended from the University for one session and was subsequently found culpable of any other blameworthy act or examination misconduct
- Penalty: Expulsion from the University.**
- (ix). Misconduct: Staff member accused of involvement in any of the acts of examination misconduct.
- Penalty: Referral to the appropriate University Investigation / Disciplinary Committee**

7.5 Channel of Communication

In order to ensure that stake holders are appropriately informed on matters pertaining to the day to day administration of Postgraduate matters in the University; the following are the channel of communication for specific stakeholder:

7.5.1 Student

Local: All correspondence emanating from any student must be routed through the student's Supervisor, the Departmental PG Representative, the Head of Department to the Dean, School of Postgraduate Studies or (through the Dean, SPGS to the Vice Chancellor, where applicable). However, the Chairman, SPGAC and the Dean of the Student's School must be copied. The student's phone number and e-mail address must be included in the correspondence.

International: All correspondence emanating from any student in this category must be routed through the student's Supervisor, the Departmental PG Representative, the Head of Department, the Director, International Office to the Dean, School of Postgraduate Studies or (through the Dean, SPGS to the Vice Chancellor, where applicable). However, the Chairman, SPGAC and the Dean of the Student's School must be copied. The student's phone number and e-mail address must be included in the correspondence

7.5.2 Staff

All correspondence emanating from staff must be routed through the Head of Department to the Dean, School of Postgraduate Studies or (through the Dean, SPGS to the Vice Chancellor, where applicable). However, the Chairman, SPGAC, the Department PG Representative and the Dean of the School must be copied. The staff's phone number and e-mail address must be included in the correspondence.

7.5.3 PG Representative /Departmental Coordinator

All correspondence emanating from PG Representative/ Departmental Coordinator must be routed through the Head of Department to the Dean, School of Postgraduate Studies or (through the Dean, SPGS to the Vice Chancellor, where applicable). However, the Chairman, SPGAC and the Dean of the Student's School must be copied. The PG Representative/Departmental Coordinator's number and e-mail address must be included in the correspondence.

7.5.4. Head of Department

All correspondence emanating from the Head of Department must be routed through the Dean of the School (through the Dean, SPGS to the Vice Chancellor, where applicable). However, the Chairman, SPGAC and the PG Representative must be copied. The HOD's phone number and e-mail address must be included in the correspondence.

7.5.5. Chairman, SPGAC

All correspondence emanating from the Chairman, SPGAC must be routed through the Dean of the School (the concerned HOD must be copied) However, the Chairman, SPGAC's phone number and e-mail address must be included in the correspondence.

7.5.6 Communication with Organs of the University

Fig.1 shows the channel of communication among the organs of the university on SPGS matters.

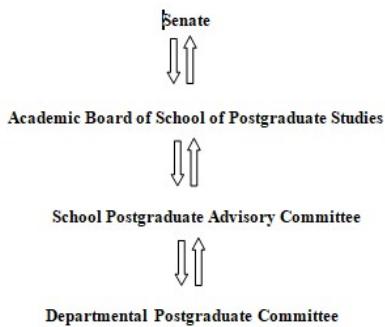


Fig. 1: Flowchart showing communication line within the organs dealing with SPGS

7.6 How to Provide a Feedback on our Services

The School of Postgraduate Studies cherishes feedbacks and also recognizes the right of its major stakeholder (Students) to complain about the quality of service(s) received from any of its officer or office. To this end, any student dissatisfied with the quality of service received from any officer or office with dealings with Postgraduate programmes is encouraged to follow the stated line of complaint in the first instance in order to ensure prompt attention.

- When the complaint is against the service(s) received from:
- (i) Staff of the SPGS (including Sub-Deans)- the complaint should be directed to the Dean, SPGS.
 - (ii) Dean of the SPGS- the complaint should be directed to the Vice Chancellor.
 - (iii) Chairman, SPGAC-the complaint should be directed to the Dean of the School in the first instance, if not satisfied, to the Dean, SPGS.
 - (iv) Head of Department- the complaint should be directed to the Dean of the School in the first instance, if not satisfied, to the Dean, SPGS.
 - (v) PG Representative or Postgraduate Diploma Coordinator -the complaint should be directed to the Head of Department, in the first instance, if not satisfied, to the Dean of the School and Dean, SPGS.
- The interest of the complainant shall be protected at all times, such that, no form of victimisation or discrimination would be allowed against the complainant. However details of the complaint must be clearly stated in order to ensure that fictitious complain is not made against any of our staff or office

SECTION EIGHT
IMPORTANT SUMMARY: FROM REGISTRATION TO EXAMINATION ROOM

Steps to take for a hitch free Postgraduate Programme (Research Component)

Stage	Remarks	Time Line	Action
Allocation of supervisors	<p>*Recommendation for admission for Masters (Major Supervisor and Co supervisor (s) (as applicable) and Ph.D should be accompanied with the list of supervisors(Major Supervisor and Co supervisors (as applicable))</p> <p>*To be approved by School Postgraduate Advisory Committee (SPAC)</p> <p>*It requires the noting of the Academic Board</p> <p>Where there is need to change Supervisors, appropriate form should be completed</p>	<p>*Masters: To accompany admission list</p> <p>*PhD: To accompany admission list</p>	<p>*Departmental PG Committee</p> <p>*Major Supervisor</p> <p>*Candidate</p> <p>*SPAC</p> <p>*PG Academic Board</p>
Annual Progress Report (APR)on candidate's research (Sessional basis)	<p>*This is to be done on a PG School form</p> <p>*Requires comments and endorsement of the Candidate, The candidate's supervisor; HOD, The Chairman, SPAC, Dean of School</p> <p>*Requires candidate's course work scores where applicable</p> <p>*Approval by the School</p>	<p>For M.Tech and PGD Students: It should be submitted within 2 weeks of the commencement of the Session. Failure to do so within this period attracts a penalty of N20,000 as from the 3rd to 5th week after which the form will no longer be accepted.</p> <p>For Ph.D Students: It should be submitted latest a month after 1st year of studentship after which N20,000 penalty applies</p>	<p>*Candidate</p> <p>*Supervisor</p> <p>*HOD</p> <p>*Dean of School</p> <p>*SPGS</p>
Renewal of candidate's registration(Annual basis)	<p>*This is to be done online after payment of Tuition Fees by all students.</p> <p>* SPGS to forward list to Departments by 7th week from the beginning of every Session</p>	<p>Two weeks after closure of APRF. A week extension after which payment of N20,000 late registration penalty</p>	<p>*Candidate</p> <p>*SPGS</p>
Pre-Data Seminar	To be presented to the Department	<p>*Masters</p> <p>*PhD</p>	<p>*Supervisors</p> <p>*Department and School</p> <p>*Audience</p>

Stage	Remarks	Time Line	Action
Progress Seminar	To be presented to the Department	*Masters *PhD	*Supervisors *Department/School *Audience
Progress Seminar Final	*A public presentation at Department on the candidate's research project report Requires adequate publicity & invitation of the University Community for Ph.D and M.Tech. *A report (including attendance record) should be forwarded to SPGS	*Masters *PhD A report (including attendance record) is expected to be forwarded to SPGS	*PG Rep, PG Seminar *Coordinator through the HOD *Candidate *Supervisors
Registration of thesis/dissertation title	Masters- *The Departmental PG Advisory Committee *SPAC to consider the list and recommend to the SPGS Academic Board for ratification and appointment of external examiner *SPGS Academic Board ratify the list and appointment of external examiner. *However, the list must be accompanied with Clearance form from SPGS for each of the student PhD- *The Departmental PG Advisory Committee *SPAC to consider the list and recommend to the SPGS Academic Board for approval and Senate's ratification. *However, the list must be accompanied with Clearance form from SPGS for each of the student	Masters- Minimum of 14 months after commencement of programme PhD- Minimum of 30 months for Full Time and 42 months for Part Time after commencement of programme	*Candidate & Major Supervisor is to ensure compliance. *Action is by Supervisors *Departmental PAC Committee *SPAC *SPGS
Supervisors' report of satisfactory progress on research work for M.Tech & Ph.D	*Supervisors' report of satisfactory progress on research work must be submitted to SPAC with copy forwarded to SPGS for M.Tech & Ph.D *A short report on candidate's research report; endorsed by ALL members of the supervision team every 6 months	Each SPAC is expected to present report on candidate's research report every 6 months	Major Supervisor Guided by PG Representative/ HOD

Stage	Remarks	Time Line	Action
Nomination of external examiner	<p>*A suitable external examiner (an expert in the student's research area) is officially nominated and recommended to Senate through the SPGS Academic Board.</p> <p>*Fresh recommendation is to be accompanied by a copy of the suggested external examiner's abridged version of the CV</p>	To accompany Thesis Title Registration Recommendation to the Academic Board	The major supervisor through the Head of Department.
Submission of soft copies of thesis/dissertation /report	<p>*Preparation of soft copies of the thesis/dissertation/report should STRICTLY COMPLY with the RECOMMENDED guidelines for preparation of thesis as provided by. When available, the SPGS shall subject the submission to Quality assurance test, for plagiarism, Compliance in this regard will save time, money and unnecessary wastages.</p> <p>* Submission of hardcopy – for Examination</p> <p>-1st week of submission to SPGS: Thesis/Dissertation forwarded to all examiners with the appropriate examination form</p> <p>-Oral examination not later than 2 months upon submission</p>		<p>Thesis prepared without compliance will not be accepted by SPGS</p> <p>Allow adequate time for Processing</p> <p><i>For action:</i></p> <ul style="list-style-type: none"> *Supervisor *HOD *Dean of School
Arrangement for oral examination	<p>*The conduct of oral examination is the responsibility of the SPGS School.</p> <p>The input of the candidate's department is important particularly in the provision of necessary information that will assist the School.</p> <p>*All examiners are to ensure that duly signed preliminary reports (using the recommended format) on the candidate's thesis/dissertation get to the School on time.</p> <p>*Fixing a date for oral examination depends on the receipt of positive external examiner's report, suitability of suggested date within stipulated period in addition to the fulfillment of other administrative conditions</p> <p>*The external Examiner in conjunction with the department should ensure that in addition to sending the copy (hard or scanned) of the preliminary thesis assessment form to the Dean, School of Postgraduate Studies, 2 weeks in advance for Masters oral examinations and 3 weeks in advance for Ph.D oral examinations; is also expected to send a copy of the same form to the Head of Department (Chief Examiner) of the candidate whose thesis is expected to be examined.</p> <p>* It is expected that the Chief Examiner, after receiving the said form, will write a letter informing the school of Postgraduate Studies of the date of arrival of the External Examiner for the candidate's oral examination, thus initiating the process of arrangement for the examination.</p> <p>*Properly completed thesis examination reports (hard and electronic copies) are to be duly endorsed by the examination panel</p>		<ul style="list-style-type: none"> *PG School confirms date for oral examination. *Examination panel members *External/Examiner/SPGS *The HOD

Stage	Remarks	Time Line	Action
Submission of Corrected/Bound version of thesis / dissertation/report and approval of results	<p>*This depends on response from the candidate and endorsement by the Major Supervisor</p> <p>*Major Supervisor is to ensure that ALL suggested corrections and amendments are effected and checked before re-submission.</p> <p>*Properly completed Certificate of correction of thesis/dissertation is to be duly endorsed by the supervisor, the HOD and the Chairman, SPAC before it is forwarded to the PG School.</p> <p>*After clearance by the Supervisor, the Certificate of correction must not spend more than 24hrs on the table of the HOD and the Chairman, SPAC before it is forwarded to the PG School.</p> <p>*Final bound copies of the thesis/dissertation in the recommended format are to be endorsed as appropriate.</p> <p><u>Recommendation (A): "Thesis/Dissertation is approved without corrections"</u></p> <p><u>Time Frame/Penalty:</u> A student for which this recommendation is returned shall be expected to submit the bound and electronic version of the thesis/dissertation within four (4) weeks after the date of the examination, failing which the candidate shall pay a penalty fee as specified at time to time.</p> <p><u>Recommendation (B): "Thesis/Dissertation approved subject to verification by Chief Examiner of corrections pointed out during the examination."</u></p> <p><u>Time Frame/Penalty:</u> A candidate for whom this recommendation is returned shall be expected to submit the corrected bound version and electronic copy of the thesis/dissertation within six (6) weeks after the date of the examination. However, if this submission should extend beyond six (6) weeks, he/she shall pay a penalty fee as specified from time to time.</p> <p><u>Recommendation (C): "Thesis/Dissertation approved subject to verification by External Examiner of corrections pointed out during the examination."</u></p> <p><u>Time Frame/Penalty:</u> A candidate for whom this recommendation is returned shall be expected to submit the corrected bound version and electronic copy of the thesis/dissertation to the Department within three (3) months after the date of the examination. The Department shall submit same to the External Examiner for final verification immediately and in any case not later than four (4) weeks from the date student submit to the Department. In case a student fails to meet the six months ultimatum, he/she shall pay a penalty fee as specified from time to time</p>	<p>*Candidate</p> <p>*Candidate Supervisor</p> <p>*HOD</p> <p>*Dean of School</p> <p><i>Allow 1-2 months for processing before requesting for statement of result</i></p>	

Stage	Remarks	Time Line	Action
	<p>Recommendation (D): "Thesis/Dissertation not approved and student should do additional work and/or re-write and be re-examined."</p> <p>Time Frame/Penalty: A candidate for whom this recommendation is returned shall be expected to re-write, be re-examined and submit his/her corrected bound version and electronic copy of the thesis/dissertation within 12 months and pay additional school fees for the sessions into which his/her studentship is extended.</p> <p>Validity</p> <p>A student who fails to submit the bound version and electronic copy of the thesis/dissertation at the expiration of the time stipulated above (Recommendations A - D) with genuine reasons already communicated to the SPGS will be given an additional period equivalent to the period earlier given subject to the payment of another fine as specified from time to time after which the examination becomes invalid.</p> <p>A student who fails to submit after the second chance shall automatically forfeit his/her studentship.</p>		

NOTES

- On no account should students handle official documents and are discouraged from having direct contact with the HOD on examination related matters. Rather, they should process ALL requests through their supervisors, Departmental Postgraduate Representative/Postgraduate Diploma Coordinator and Head of Department (see section 7.5 for appropriate channel of communications)
- It is important that the office of the HOD keeps good records of movement of official documents.
- All matters involving substitution of supervisors due to various reasons should be properly resolved before the conduct of oral examination.
- As much as possible, copies of correspondence in respect of each candidate are required to be kept in the candidate's departmental file as a back-up copy.
- Time and money have been wasted in the desire to get things done quickly particularly towards the end of the session. Candidates and supervisors will be responsible for delays arising from not doing things right. It is therefore important that we plan our time and also be conscious of the duties and responsibilities of all concerned.
- At every stage the need to be THOROUGH is VERY ESSENTIAL.
- Every effort should be geared towards preserving the integrity of the degree in view.

SECTION NINE DEPARTMENTAL PROGRAMMES

9.1 SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY (SAAT)

9.1.1 DEPARTMENT OF AGRICULTURAL EXTENSION AND COMMUNICATION TECHNOLOGY (AEC) PROGRAMMES OFFERED:

- A. M. Agric Tech with specialization in:
 - i General Extension
 - ii Agricultural Communication
 - iii Technology Transfer
 - iv Rural Development
- B. Ph.D with specialization in:
 - i General Extension
 - ii Agricultural Communication
 - iii Technology Transfer
 - iv Rural Development

PHILOSOPHY AND OBJECTIVES

The objectives of post graduate programme in the department are to train professional agricultural extensions, rural sociologist and social development worker who will serve in both private and public sectors of the economy.

The philosophy of the programme is to provide functional education for post-graduate student who eventually after the training will become job maker and job creator, who in addition will be trainer of top level academic and master of industrial sector.

ADMISSION REQUIREMENTS

A.Master of Agricultural Technology (M. Agric. Tech.)

- i. Candidates with first degree in Agriculture and related discipline with a minimum of Second Class lower Division.

B Doctor of Philosophy (Ph.D)

Candidates with M. Tech/M. Agric Tech/M.Sc. in Food Science and Technology and related disciplines from other recognised institutions with a CGPA of not less than 3.50 or 60% in the overall result. Where applicable, the candidate may be required to score not less than 60% in the overall thesis examination.

DURATION OF THE PROGRAMME

A Master of Agricultural Technology (M. Agric Tech)

Full time: 18-24 months

B Doctor of Philosophy (Ph.D)

Full time: 36-48 months

Part time: 48-72 months

REQUIREMENTS FOR GRADUATION

A Master of Agricultural Technology Programme (M. Agric. Tech.)

- i. Accumulated TLU of 45 including 12 units of Research Project, 33 units of 11 compulsory or core courses.

- ii. Successfully presented 3 Departmental Research Project Seminars.
- iii. Successfully defended the Research Project in the specialist area at an oral examination organized by the School of post-graduate studies.

B Doctor of philosophy Ph.D PROGRAMME

A candidate is awarded a Ph.D degree after he has successfully:

- i. Completed any prescribed course work.
- ii. Presented 3 Departmental Research Project Seminars,
- iii. Defended the research thesis in a specialist area at an oral examination organized by the school of post-graduate studies.

COURSE OUTLINE (AGRICULTURAL EXTENSION AND COMMUNICATION TECHNOLOGY OPTION)

1ST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
AEC 801	Research Methodology	3	0	0	3
AEC 825	Program Planning and Evaluation	3	0	0	3
AEC 827	Extension Administration	3	0	0	3
AEC 829	Advanced Rural Sociology	3	0	0	3
AEC 831	Advanced Psychology for Extension Personnel	3	0	0	3
	Total				15

2ND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
AEC 826	Statistical Theory & Analysis	3	0	0	3
AEC 828	Participatory & Rural development Approach	3	0	0	3
AEC 830	Measurement & Scaling Technique in extension	3	0	0	3
AEC 832	Extension Teaching and Communication	3	0	0	3
AEC 834	Advanced Social Work	3	0	0	3
AEC 836	Seminar	3	0	0	3
	Total				18

3RD SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
AEC 899	Master's Thesis Research Project				12

AEC 801 RESEARCH METHODOLOGY 3 UNITS

Steps in the research process and their application; science and scientific methods; delineation of research problems and development of research objectives, research designs in social research, data gathering with emphasis on field surveys, analyzing data and reporting results. Students are expected to demonstrate their understanding of research methodology by preparing a research proposal dealing with economic problems.

AEC 825 PROGRAM PLANNING AND EVALUATION 3 UNITS

Principle and concepts of Program Planning in Extension; Basic Steps in Program Development; Determination of needs, Clarification of Problems, Setting of Objectives. Development of a plan, Obtaining Staff and Clientele commitment to action, Program implementation and appraisal.

AEC 826 STATISTICAL THEORY AND ANALYSIS 3 UNITS

Descriptive statistics; Mean, Median, Mode, Histogram, Bar Chart, Pie Chart, Inferential statistics; Chi square, Analysis of Variance, t-test, Correlation, Regression. Measurement of Variables.

AEC 827 EXTENSION ADMINISTRATION 3 UNITS

Theory and Practice of Administration Organisational Structure as applied to Agric. Extension Services in Nigeria, Personnel Management, Fiscal Control, Assessment of Extension work accomplishment.

AEC 828 PARTICIPATORY AND RURAL DEVELOPMENT APPROACHES 3 UNITS

Identification of needs, Past and Present Rural development Strategies Dimensions of Rural Extension- Research Linkages (Terminology transfer) Participatory Approach in Rural Development Extension Models.

AEC 829 ADVANCED RURAL SOCIOLOGY 3 UNITS

General Sociology, Theory Analysis of Social System, Relation of Individual to his Social environment, Group Dynamics, Leadership Patterns, Social Change and Community Organisation.

Special Topics in Rural Sociology.**AEC 830 MEASUREMENT AND SCALING TECHNIQUE IN EXTENSION 3 UNITS**

Meaning and scales of Measurement, Factors influencing the choice of appropriate parametric tests, Principles of Test Construction- statistical concepts, Item Analysis. Types and Measurement of Reliability and validity. Techniques for attitude scale construction, method of paired comparison. Equal-appearing intervals, successive intervals, summated ratings scalogram analysis.

AEC 831 ADVANCED PSYCHOLOGY FOR EXTENSION PERSONNEL 3 UNITS

Concepts of Human Development; Intelligence; Individual Differences; Teaching learning Process; Motivation to extension Education.

AEC 832 EXTENSION TEACHING AND COMMUNICATION 3 UNITS

Setting up effective learning situation in Rural Areas; Motivation principles in adult learning communication and diffusion process; Practice of selective Extension methods including Demonstrations, meetings, tours, exhibits and audio visual aids.

AEC 834 ADVANCED SOCIAL WORK 3 UNITS

Concept of Social Work strategies for Communal Mobilization for Developmental Projects. Social Work Techniques and Appraisal; Methods social Work Designs; Social Work in Health. Nutrition Environmental Management Education etc. Evaluation in Social Work.

AEC 836 SEMINAR 3 UNITS

Seminar Topics in Areas of Agricultural Extension and Communication. Each candidate is expected to make two seminar presentations.

AEC 899 MASTER'S THESIS RESEARCH PROJECT 12 UNITS

An original investigation in a title approved by the school of Post Graduate Studies. A thesis must be completed with significant contribution to knowledge. The thesis shall be defended in an open and oral examination organized by the School of Postgraduate Studies.

AEC 999 Ph.D RESEARCH PROJECT

An original investigation in a title approved by the school of Post Graduate Studies. A thesis must be completed with significant contribution to knowledge. The thesis shall be defended in an open and oral examination organized by the School of Postgraduate Studies.

LIST OF ACADEMIC STAFF (AEC)

S/N	Name of Staff	Status	Qualification	Area of specialisation
1	Prof. J.O. Okunlola	Professor	B.Sc, M.Sc, Ph.D (Ibadan)	Agric. Extension & Rural Sociology
2.	Prof. S.D.Y. Alfred	Professor	B.Sc (Ekpoma), M.Sc (Ibadan) Ph.D.(Akure)	Rural Psychological Studies & Health
3.	Dr. O. O. Fasina	Senior Lecturer	B. Agric (Abeokuta), M.Sc, Ph.D (Ibadan)	Agric. Extension & Rural Sociology
4	Dr. O.M. Akinnagbe	Lecturer 1	NCE (Ijebu-Ode), B.Agric , M.Sc, Ph.D (Nigeria)	Agric. Planning & Evaluation
5	Dr. O. O. Odefadehan	Lecturer I	B.Agric (Ibadan), M.Agric. Tech, Ph.D (Akure)	Rural Sociology
6	Dr (Mrs) B. O. Akinwale	Lecturer I	B. Agric. Tech, MBA, M.Tech, Ph.D (Akure)	Environmental Extension & Management
7	Dr J. A. Akinwale	Lecturer II	NCE (Ijebu Ode) B.Agric (Abeokuta) M.Sc, Ph.D (Ibadan)	Agricultural Extension and Rural Development

9.1.2 DEPARTMENT OF ANIMAL PRODUCTION & HEALTH (APH) ANIMAL REPRODUCTION AND PHYSIOLOGY OPTION

A CORE COURSES:		UNITS	D SUMMARY
i.	Biostatistics and Experimental Design	3	1 st Semester
ii.	Research Techniques in Animal Production and Health	3	2 nd Semester
iii.	Computer Applications in Animal Production and Health	3	3 rd & 4 th Semester
iv.	Advanced Monogastric Animal Management	2	
v.	Advanced Ruminant Animal Management	2	
Sub-total		13	Total
B REQUIRED COURSES		UNITS	FIRST SEMESTER
i.	Advanced Reproductive Physiology	3	APH 801 Biostatistics and Experimental Design 3
ii.	Advanced Endocrinology	3	APH 803 Computer Application in Animal Production 3
iii.	Environmental Physiology	3	APH 855 Advanced Monogastric Management 2
iv.	Reproductive and Controlled Breeding	3	APH 813 Advanced Reproductive Physiology 3
v.	Physiology of Lactation	2	APH 819 Environmental Physiology 3
vi.	Artificial Insemination	3	APH 821 Physiology of Lactation 2
vii.	Animal Biotechnology	2	APH 817 Animal Biotechnology 2
viii.	Comparative Embryology of Farm Animals	3	APH 811 Animal breeding and genetics 3
ix.	Student's Seminar	2	
x.	Dissertation	12	
Sub-total		36 units	TOTAL
C ELECTIVES		UNITS	SECOND SEMESTER
i	Advanced Ethology	2	Course Code
ii	Molecular and Biochemical Genetics	3	Course Title
iii	Immunogenetics	2	Units
iv	Digestive Physiology	2	
v	Physiology of Growth	3	
vi	Nutritional Toxicology	2	
Sub-total		14 Units	APH 802 Research Techniques in Animal Production 3
			APH 806 Advanced Ruminant Management 2
			APH 824 Advanced Endocrinology 3

APH 826	Reproductive Management & Controlled Breeding	3
APH 828	Artificial Insemination	3
APH 858	Comparative Embryology of Farm Animals	3
APH 800	Students' Seminar	2
	TOTAL	19

FIRST SEMESTER

Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3
APH 803	Computer Application in Animal Production and Health	3
APH 855	Advanced Monogastric Management	2
APH 825	Advanced Biochemistry	3
APH 805	Advanced Animal Nutrition	2
APH 809	Laboratory Techniques and Instrumentation	3
APH 851	Bioenergetics	3
APH 829	Nutritional Toxicology	2
	TOTAL	21

THIRD & FOURTH SEMESTER

Course Code	Course Title	Units
APH 899	Dissertation	12
	TOTAL	12

AGRICULTURAL BIOCHEMISTRY AND NUTRITION OPTION

A CORE COURSES	UNITS
i. Biostatistics and Experimental Design	3
ii. Research Techniques in Animal Production and Health	3
iii. Computer Applications in Animal Production and Health	3
iv. Advanced Monogastric Animal Management	2
v. Advanced Ruminant Animal Management	2
Sub-total	13
B REQUIRED COURSES	UNITS
i. Advanced Biochemistry	3
ii. Advanced Animal Nutrition	2
iii. Bioenergetics	3
iv. Laboratory Techniques and Instrumentation	3
v. Advanced Animal Products and by-Products Technology	3
vi. Feeds, Feed Production and Feed-mill Management	3
vii. Advanced Ruminant Animal Management	2
viii. Metabolism of Minerals and Vitamins	3
ix. Metabolism of Proteins and Nucleic acids	2
x. Student's Seminar	2
xi. Dissertation	12
Sub-total	38
C ELECTIVES	UNITS
i. Nutritional Toxicology	2
ii. Animal Health and Disease control	3
iii. Advanced Pasture and Range Management	3
iv. Forage Resources and Utilization	3
vi. Dissertation	12
Sub-total	23

Electives

Course Code	Course Title	Units
APH 808	Animal Health and Disease Control	3
APH 817	Animal Biotechnology	2
	TOTAL	5

SECOND SEMESTER

Course Code	Course Title	Units
APH 806	Advanced Ruminant Animal Management	2
APH 814	Feeds, Feed Production and Feed-mill Management	3
APH 820	Metabolism of Minerals and Vitamins	3
APH 822	Metabolism of Proteins and Nucleic acids	2
APH 844	Advanced Animal Products and by products Technology	3
To be renamed	Advanced Pasture and Range Management	3
APH 800	Students' Seminar	2
	TOTAL	18

Electives

Course Code	Course Title	Units
APH 818	Forage Resources and Utilization	3
	TOTAL	3

THIRD & FOURTH SEMESTER

Course Code	Course Title	Units
APH 899	Dissertation	12
	TOTAL	12

D SUMMARY:

1 st Semester	21units
2 nd Semester	18units
3 rd &4 th Semesters	12units
Total	51 units

ANIMAL BREEDING AND GENETICS OPTION

A. CORE COURSES	UNITS
i. Biostatistics and Experimentation Design	3
ii. Computer Application in Animal Production & Health	3
iii. Advanced Monogastric Animal Management	2
iv. Advanced Ruminant Animal Management	2
v. Research Techniques in Animal Production	3
Sub-total	13
B. REQUIRED COURSES	UNITS
i. Advanced Animal Breeding and Genetics	3
ii. Molecular and Biochemical Genetics	3
iii. Research Techniques in Animal Production & Health	3
iv. Quantitative Genetics	3
v. Advanced Reproductive Physiology	3
vi. Introduction to Population Genetics	3
vii. Immunogenetics	3
viii. Animal Biotechnology	2
ix. Students' seminar	2
x. Dissertation	12
Sub-total	37
C. ELECTIVES	UNITS
i. Reproductive Management and Controlled Breeding	3
ii. Livestock Farming Systems	3
iii. Advanced Ethology	2
Sub-total	8

FIRST SEMESTER

Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3
APH 803	Computer Application in Animal Production & Health	3
APH 855	Advanced Monogastric Management	2
APH 809	Laboratory Techniques and Instrumentation	3

APH 811	Advanced Animal Breeding and Genetics	3
APH 833	Molecular and Biochemical Genetics	3
APH 813	Advanced Reproductive Physiology	3
APH 817	Animal Biotechnology	2
	TOTAL	22

Electives

Course Code	Course Title	Units
APH 844	Advanced Animal Products and by products Technology	3
	TOTAL	3

SECOND SEMESTER

Course Code	Course Title	Units
APH 802	Research Techniques in Animal Production and Health	3
APH 830	Quantitative Genetics	3
APH 806	Advanced Ruminant Animal Management	2
APH 846	Population Genetics	2
APH 836	Immunogenetics	3
APH 860	Bioinformatics	2
APH 800	Students' Seminar	2
	TOTAL	17

Electives

Course Code	Course Title	Units
APH 810	Advanced Ethology	2
APH 826	Reproductive Management and Controlled Breeding	3
APH 816	Livestock Farming	3
	TOTAL	8

THIRD & FOURTH SEMESTER

Course Code	Course Title	Units
APH 899	Dissertation	12
	TOTAL	12

D	SUMMARY		Electives
	1 st Semester	22units	
	2 nd Semester	17units	
	3 rd &4 th Semesters	12units	
	Total	51 units	
	M.AGRIC. TECH. ANIMAL PRODUCTION AND MANAGEMENT OPTION		
A.	CORE COURSES	UNITS	
i.	Biostatistics and Experimentation Design	3	
ii.	Computer Application in Animal Production and Health	3	
iii.	Advanced Monogastric Animal Management	2	
iv.	Advanced Ruminant Animal Management	2	
v.	Research Techniques in Animal Production and Health	3	
	Sub-total	13units	
B.	REQUIRED COURSES		
i.	Advanced Animal breeding and Genetics	2	
ii.	Advanced Animal Nutrition	2	
iii.	Laboratory Techniques and Instrumentation	3	
iv.	Advanced Reproductive Physiology	3	
v.	Advanced Ruminant Animal Management	2	
vi.	Advanced Animal Products and by-product Technology	3	
vii.	Animal Health and Disease Control	3	
viii.	Advanced Ethology	3	
ix.	Students' Seminar	2	
x.	Laboratory Techniques and Instrumentation	3	
xi.	Livestock Farming Systems	3	
xii.	Dissertation	12	
	Sub-total	41units	
	FIRST SEMESTER		Electives
	Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3	
APH 803	Computer Application in Animal Production	3	
APH 855	Advanced Monogastric Management	2	
APH 811	Advanced Animal breeding and Genetics	2	
APH 805	Advanced Animal Nutrition	2	
APH 809	Laboratory Techniques and Instrumentation	3	
APH 813	Advanced Reproductive Physiology	3	
APH 839	Advanced Pasture &Range Management	3	
	TOTAL	21	
	THIRD & FOURTH SEMESTER		
	Course Code	Course Title	Units
APH 899	Dissertation	12	
	TOTAL	12	
D.	SUMMARY		
	1 st Semester	21unit	
	2 nd Semester	21units	
	3 rd and 4 th Semesters	12units	
	Total	54units	

M. AGRIC TECH. PASTURE AND RANGE MANAGEMENT OPTION		
A CORE COURSES:	UNITS	
i. Biostatistics and Experimental Design	3	
ii. Research Techniques in Animal Production and Health	3	
iii. Computer Applications in Animal Production & Health	3	
iv. Advanced Monogastric Animal Management	2	
v. Advanced Ruminant Animal Management	2	
Sub-total	13	
B REQUIRED COURSES	UNITS	
i. Pasture Breeding and Genetics	3	
ii. Advanced Animal Nutrition	2	
iii. Advanced Pasture and Range Management	3	
iv. Laboratory Techniques and Instrumentation	3	
v. Forage Resources and Utilization	3	
vi. Forage Conservation and Quality	3	
vii. Feeds, Feed production and Feed mill Management	3	
viii. Animal Traction	2	
ix Seminar	2	
x Dissertation	12	
Sub-total	36	

THIRD & FOURTH SEMESTER

Course Code	Course Title	Units
APH 899	Dissertation	12
	TOTAL	12

D. SUMMARY

1 st Semester	19units
2 nd Semester	19units
3 rd and 4 th Semesters	12units
Total	50 units

FIRST SEMESTER

Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3
APH 803	Computer Application in Animal Production	3
APH 855	Advanced Monogastric Management	2
APH 809	Laboratory Techniques and Instrumentation	2
APH 837	Pasture Breeding and Genetics	3
APH 839	Advanced Pasture and Range Management	3
APH 805	Advanced Animal Nutrition	2
	TOTAL	18

SECOND SEMESTER

Course Code	Course Title	Units
APH 802	Research Techniques in Animal Production	3
APH 818	Forage Resources and Utilization	3

M. AGRIC. TECH. ANIMAL MICROBIOLOGY OPTION

A CORE COURSES:	UNITS
i. Biostatistics and Experimental Design	3
ii. Research Techniques in Animal Production & Health	3
iii. Computer Applications in Animal Production & Health	3
iv. Advanced Monogastric Animal Management	2
v. Advanced Ruminant Animal Management	2
Sub-total	13
B REQUIRED COURSES	UNITS
i. Advanced Virology	2
ii. Advanced General Veterinary Microbiology	3
iii. Advanced Animal Mycology and Mycoplasmology	3
iv. Advanced Animal Biolotechnology	2
v. Veterinary Laboratory Diagnosis and Instrumentation	2
vi. Advanced Immunology	3
vii. Advanced Systemic Bacteriology	3
viii. Microbial Physiology	3
ix. Dissertation	12
Sub-total	33
A. Electives	
i. Advanced Pharmaceutical Microbiology	2
i. Selected Topics in Animal Health and Preventive Medicine	3
ii. Advanced Theriogenology	3
iii. Microbial Genetics	3
Sub-total	11

FIRST SEMESTER

Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3
APH 803	Computer Application in Animal Production & Health	3
APH 855	Advanced Monogastric Management	2
APH 845	Advanced Virology	2
APH 847	Advanced General Veterinary Microbiology	3
APH 849	Advanced Animal Mycology and Mycoplasmology	3
APH 817	Advanced Animal Biotechnology	2
	TOTAL	18

Electives

Course Code	Course Title	Units
APH 853	Advalnced Pharmaceutical Microbiology	2
	TOTAL	2

SECOND SEMESTER

Course Code	Course Title	Units
APH 800	Seminar	2
APH 806	Advanced Ruminant Animal Management	2
APH 802	Research Techniques in Animal Production and Health	3
APH 804	Veterinary Laboratory Diagnosis and Instrumentation	2
APH 808	Animal Health and Disease control	3
APH 812	Advanced Immunology	3
APH 848	Advanced Systemic Bacteriology	3
APH 850	Microbial Physiology	3
	TOTAL	21

Electives

Course Code	Course Title	Units
APH 852	Advanced Theriogenology	3
APH 854	Microbial Genetics	3
	TOTAL	6

Course Code	Course Title	Units
APH 899	Dissertation	12
	TOTAL	12

D. SUMMARY

1 st Semester	21units
2 nd Semester	18units
3 rd and 4 th Semesters	12units
Total	51 units

M. AGRIC TECH. ANIMAL PARASITOLOGY OPTION

CORE COURSES:	UNITS
i. Biostatistics and Experimental Design	3
ii. Research Techniques in Animal Production	3
iii. Computer Applications in Animal Production	3
iv. Advanced Monogastric Animal Management	2
v. Advanced Ruminant Animal Management	2
Sub-total	13

B REQUIRED COURSES	UNITS
i. Laboratory Techniques and Instrumentation	3
ii. Selected Topics in Animal Health and Preventive Medicine	3
iii. Advanced General Parasitology	3
iv. Biotechnology for Parasite Control	3
v. Advanced Protozoology	3
vi. Taxonomy of Parasites of Medical & Veterinary importance	3
vii. Dissertation	12
Sub-total	30

C. ELECTIVES

i. Physiology and Biochemistry of Parasitic Diseases	3
ii. Public Health and Sanitary Practices	3
iii. Communicable Diseases and Vector Biology	3
iv. Wild Life Parasitology	3
v. Phytomedicine and Medical Parasitology	3
vi. Transmission of Tropical Diseases	3
Sub-total	18

FIRST SEMESTER

Electives

Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3
APH 803	Computer Application in Animal Production &Health	3
APH 855	Advanced Monogastric Management (MAY BE DELETED)	2
APH 843	Advanced Parasitology	3
APH 841	Biotechnology for Parasite Control	2

APH 827	Advanced Protozoology	3
BIO 845	Taxonomy of Parasites of Medical and Veterinary importance	3
	TOTAL	18

Course Code	Course Title	Units
APH 899	Dissertation	12
	TOTAL	12

Course Code	Course Title	Units
BIO 847	Physiology and Biochemistry of Parasitic Diseases	3
BIO 823	Public Health and Sanitary Practices	3
BIO 821	Communicable Diseases and Vector Biology	3
APH 856	Wild life parasitology	2
	TOTAL	11

SECOND SEMESTER

Course Code	Course Title	Units
APH 800	Seminar	2
APH 806	Advanced Ruminant Animal Management	2
APH 802	Research Techniques in Animal Production and Health	3
APH 804	Veterinary Laboratory Diagnosis and Instrumentation	2
APH 832	Applied Helminthology	3
APH 842	Immunology of Parasitic Infections	3
APH 865	Techniques in Molecular Parasitology	3
APH 834	Epidemiology of Parasitic Diseases	3
	TOTAL	21

Electives

THIRD & FOURTH SEMESTER

Course Code	Course Title	Units
APH 858	Ethnoveterinary Medicine	3
BCH 817	Phytomedicine and Medical Parasitology	3
BIO 842	Transmission of Tropical Diseases	3
	TOTAL	9

D SUMMARY

1 st Semester	18units
2 nd Semester	21units
3 rd and 4 th Semesters	12units
Total	51units

FARM HYGIENE AND DISEASE PREVENTION OPTION

A CORE COURSES:	UNITS
i. Biostatistics and Experimental Design	3
ii. Research Techniques in Animal Production	3
iii. Computer Applications in Animal Production	3
iv. Advanced Monogastric Animal Management	2
v. Advanced Ruminant Animal Management	2
Sub-total	13

B REQUIRED COURSES	UNITS
i. Meat, Milk and Fish Hygiene	2
ii. Zoonoses and Environmental Health	2
iii. Epidemiology of Farm Animal Diseases	2
iv. Advanced Farm and Abattoir Hygiene	2
v. Research Techniques in Animal Production and Health	3
vi. Veterinary Laboratory Diagnosis and Instrumentation	3
vii. Water Analysis	2
viii. Advanced Immunology	3
ix. Biodeterioration and Biodegradation	2
x. Advanced Economics	2
xi. Student's Seminar	2
xii. Dissertation	12
Sub-Total	37

C ELECTIVES	UNITS
i. Advanced Animal Biotechnology (APH817)	2
ii. Advanced Microbial Ecology (APH819)	2
iii. Advanced Theriogenology (APH852)	2
iv. Biodeterioration and Biodegradation	2
v. Advanced Economics	2
Sub-tota	10

FIRST SEMESTER SECOND SEMESTER

Course Code	Course Title	Units
APH 801	Biostatistics and Experimental Design	3
APH 803	Computer Application in Animal Production	3

APH 855	Advanced Monogastric Management	2
APH 857	Meat, Milk and Fish Hygiene	2
APH 859	Zoonoses and Environmental Health	2
APH 861	Epidemiology of Farm Animal Diseases	2
APH 863	Advanced Farm and Abattoir Hygiene	2
	TOTAL	16

Course Code	Course Title	Units
APH 802	Research Techniques in Animal Production	3
APH 806	Advanced Ruminant Management	2
APH 804	Veterinary Laboratory Diagnosis and Instrumentation	3
APH 860	Water Analysis	2
APH 812	Advanced Immunology	3
APH 862	Biodeterioration and Biodegradation	2
APH 815	Livestock production Economics and Extension	2
APH 800	Student's Seminar	2
	TOTAL	19

LIST OF ACADEMIC STAFF

S/N	Surname	Others	Qualification	Designation	Area of Specialization
1	Onibi	Gbenga Emmanuel	B.Tech., MSc., PhD	Prof.	Animal Nutrition/Meat Science & Products Enhancement.
2	Alector	Vincent Ayobore	BSc., MSc., PhD, Cert Cell Res.	Prof.	Agric. Biochemistry & Nutrition.
3	Alokan	Julius Adebayo	BSc., MSc., PhD	Prof.	Ruminant Nutrition & Management.
4	Awoniyi	Tunde Amos Mcjones	OND, DVM, MSc., PhD.	Prof.	Public Health & Farm Hygiene.
5	Adebayo	Isaac Abayomi	DVM, MVSc., Cert. In Immunol. PhD	Prof.	Vet. Microbiology (Virology) & Immunology.
6	Chineke	Clifford Adima	BSc., MSc., PhD	Prof.	Animal Breeding & Genetics.
7	Agbede	Johnson Oluwasola	B.Agric. Tech., M.Tech., PhD Cert Dairy Cattle Production	Prof.	Agric. Biochemistry & Nutrition.
8	Igbasan	Francis Adegbaye	B.Tech., MSc., PhD Agric.	Dr./Reader	Agric. Biochemistry & Nutrition.
9	Osho	Innocent Bamidele	DVM, M.Agric. Tech., PhD	Dr. /Reader	Vet. Parasitology & Microbiology.
10	Asaniyan	Emmanuel Kehinde	B.Agric. Tech., M.Tech., PhD	Dr./S. Lect.	Poultry Production & Management.
11	Fajemisin	Noah Adebawale	BSc., MSc., PhD	Dr./S. Lect.	Ruminant Nutrition & Management.
12	Aro	Samuel Olanrewaju	BSc., MSc., PhD	Dr./Snr. Lect.	Animal Physiology & Reproduction.
13	Faluyi	Oyetayo Bolanle	DVM, M.Tech.,	Dr/Lect. I	Microbiology& Parasitology
14	Adu	Olufemi Adesanya	B.Tech., MSc., PhD	Dr. /Lect. I	Animal Physiology & Reproduction.
15	Adegbenro	Muyiwa	B.Agric. Tech., M.Tech., PhD	Lect. II	Poultry Management & Nutrition.
16	Adekolurejo	Opeyemi Oyinda	DVM, MVPH,	Dr. / Lect. II	Veterinary Public Health.
17	Ibhaze	Gladys Abiemwense	B.Agric. PGDE, M.Sc.	Dr./Lect. II	Dairy Science & Ruminant Nutrition.

9.1.3 DEPARTMENT OF AGRICULTURAL ECONOMICS & EXTENSION (AEE)

1. PROGRAMMES OFFERED:

- (a) Postgraduate Diploma (PGD).
- (b) Master of Technology (M. Agric. Tech)
- (c) Doctor of Philosophy (PhD).

2. AVAILABLE OPTIONS/SPECIALISATION

- (a) PGD with specialization in:
 - (i) Agricultural Economics.
 - (ii) Agricultural Extension.
- (b) M. Agric. Tech with specialization in:
 - (i) Agricultural Economics.
 - (ii) Agricultural Extension
- (c) PhD with specialization in:
 - (i) Agricultural Economics.
 - (ii) Agricultural Extension.

3. PHILOSOPHY AND OBJECTIVES

The objectives of postgraduate programmes in the department are to train professional agricultural extensions, rural sociologist and social development worker who will serve in both private and public sectors of the economy.

The philosophy of the programme is to provide functional education for post-graduate students who eventually after the training will become job makers and job creators, who in addition will be trainers of top level academic and masters of industrial sector.

4. ADMISSION REQUIREMENTS

(a) Postgraduate Diploma (PGD)

- (i) Candidates with a Higher National Diploma (HND) in Agriculture or allied discipline with not less than Lower Credit level.
- (ii) Candidates with a 3rd Class and above in any area of Agriculture or related disciplines from recognized Universities.

(b) Master of Agricultural Technology (M. Agric. Tech)

- (i) Candidates with PGD (Upper Credit or Distinction)
- (ii) Candidates with first degree in Agriculture and related disciplines with a minimum of Second Class Lower Division.

(c) Doctor of Philosophy (Ph.D).

Candidates with M.Tech/ M.Agric. Tech./ M.Sc. in Agricultural Economics and Extension and related disciplines from other recognized Institutions with a CGPA of not less than 3.50 or 60% in the overall result.
Where applicable, the candidate may be required to score not less than 60% in the oral thesis examination.

5. DURATION OF THE PROGRAMME

(a) Postgraduate Diploma (PGD)

The academic programme, which will be on a part-time basis, includes a course work and a supervised thesis project and both will cover a period of 3 semesters.

6. REQUIREMENTS FOR GRADUATION

- (a) Post graduate Diploma (PGD)

To be eligible for the award of PGD, a candidate must have passed 36units of course work including 6 of Research Project.
- (b) Master of Agricultural Technology Programme (M. Agric. Tech)
 - (i) Accumulated TLU of 36 including 12 units of Research Project, 18units of compulsory or core courses and 6 units of Elective,
 - (ii) Successfully presented 3 Departmental Research Project Seminars,
 - (iii) Defended the Research thesis in a specialist area at an oral examination organized by the School of Postgraduate Studies.
- (c) Doctor of Philosophy Ph.D PROGRAMME

A candidate is awarded a Ph.D degree after he has successfully:

 - (i) Completed any prescribed course work;
 - (ii) Presented 3 Departmental Research Project seminars;
 - (iii) Defended the Research thesis in a specialist area at an oral examination organized by the School of Postgraduate Studies.

7. COURSE OUTLINE

(a) PGD:

1ST SEMESTER

Agricultural Extension Option

Course Code	Course Title	T	L	P	Units
AEE 701	Concept, Principle and Practice of Agricultural Extension	2	0	0	2
AEE 703	Introduction to Rural Sociology	2	1	0	3
AEE 709	Agricultural Programme, Planning	2	0	0	2
AEE 711	Research and Statistical Methods In Extension	2	0	0	2
AEE 713	Extension Communication in Agriculture	2	0	0	2
AEE 717	Women Development Programme	2	0	0	2
AEE 719	Seminar/Term Paper	2	0	0	2
	ELECTIVES				4
	TOTAL				25

Electives

Course Code	Course Title	T	L	P	Units
AEE 705	Production and use of AudioVisual aids in Extension	1	0	3	2
AEE 707	Social change and Rural Development Strategies	2	0	0	2
AEE 715	Introduction to Technologies Change	2	0	0	2

AEE 725	Principles of Farm Management	3	0	0	3
AEE 727	Mathematics for Agriculturist	3	0	0	3
AEE 729	Farm records & Accounts	2	0	0	2
AEE 731	Term paper/seminar	2	0	0	2
AEE 737	Labour & Personnel Management	2	0	0	2
	ELECTIVES				4
AEE 799	PGD Research Project				6
	TOTAL				27

SECOND SEMESTER

Course Code	Course Title	T	L	P	Units
AEE 702	Agricultural Extension Training & Techniques	2	0	0	2
AEE 704	Youth Programmes in Agricultural Extension	3	0	0	3
AEE 706	Diffusion and Adoption of Innovation	2	0	0	2
AEE 708	Group Dynamics and Leadership Programme	2	0	0	2
AEE 710	Extension Administration	2	0	0	2
AEE 712	Training and visit system in Agricultural Extension	2	0	0	2
AEE 714	Analysis of Rural Development Programmes in Nigeria. ELECTIVES	2	0	0	2
					4
	TOTAL				19

Electives

Course Code	Course Title	T	L	P	Units
AEE 733	Research Methods	3	0	0	3
AEE 735	Resource Economics	2	0	0	2

SECOND SEMESTER

Course Code	Course Title	T	L	P	Units
AEE 722	Macro-Economics	3	0	0	3
AEE 724	Agricultural Finance	3	0	0	3
AEE 726	Agricultural Marketing	2	0	0	2
AEE 730	Agricultural Production	2	0	0	2
AEE 732	Introduction to Economics	2	0	0	2
	TOTAL				12

Electives

Course Code	Course Title	T	L	P	Units
AEE 728	Agricultural Development & Policy	3	0	0	3
AEE 734	Project Appraisal & Analysis	2	0	0	2
AEE 736	Agribusiness Management	2	0	0	2

M. TECH (AGRICULTURAL ECONOMICS OPTION)**FIRST SEMESTER****Electives**

Course Code	Course Title	T	L	P	Units
AEE 728	Agricultural Development and Policy	2	1	0	3
AEE 734	Project Appraisal and Analysis	2	0	0	2
AEE	Agribusiness Management	2	0	0	2

FIRST SEMESTER**Agricultural Economics Option**

Course Code	Course Title	T	L	P	Units
AEE 721	Micro-Economics	3	0	0	3
AEE 723	Statistical Methods & Analysis	2	0	0	2

Course Code	Course Title	T	L	P	Units
AEE 801	Research Methodology	3	0	0	3
AEE 803	Advanced Microeconomic Theory	3	0	0	3
AEE 805	Statistical Theory & Analysis	3	0	0	3
AEE 807	Operations Research	2	0	0	2
	ELECTIVES				4
	TOTAL				15

ELECTIVES

Course Code	Course Title	T	L	P	Units
AEE 809	Agricultural Marketing	2	0	0	2
AEE 811	Agricultural Planning & Appraisal	2	0	0	2
AEE 813	Agribusiness Management	2	0	0	2

OTHERS (FOR Ph.D STUDENTS)*

Course Code	Course Title	T	L	P	U
AEE 818	Seminar in Production Economics and Farm Management	2	0	0	2
AEE 820	Seminar in Quantitative Techniques	2	0	0	2
AEE 822	Seminar in Resource Economics	2	0	0	2
AEE 824	Seminar in Marketing/Cooperative Business Management	2	0	0	2

*Ph.D students are required to offer 6 units of M. Tech. Course work relevant to their area of specialization.

**M. TECH (AGRICULTURAL EXTENSION OPTION)
FIRST SEMESTER**

Course Code	Course Title	T	L	P	U
AEE 801	Research Methodology	3	0	0	3
AEE 825	Program Planning &Evaluation	3	0	0	3
AEE 827	Extension Administration	3	0	0	3
AEE 829	Advanced Rural Sociology	3	0	0	3
AEE 831	Advanced Psychology for Extension Personnel	3	0	0	3
	ELECTIVES				2
	TOTAL				17

Electives

Course Code	Course Title	T	L	P	Units
AEE 807	Operation Research	2	0	0	2
AEE 809	Agricultural Marketing	2	0	0	2
AEE 811	Agricultural Planning and Appraisal	2	0	0	2
AEE 813	Agribusiness Management	2	0	0	2

SECOND SEMESTER

Course Code	Course Title	T	L	P	Units
AEE 826	Statistical Theory & Analysis	3	0	0	3
AEE 828	Participatory & Rural Development Approach	3	0	0	3
AEE 830	Measurement and Scaling Technique in Extension	3	0	0	3

Electives

Course Code	Course Title	T	L	P	Units
AEE 812	Agricultural Finance	2	0	0	2
AEE 814	Agricultural Policy and Analysis	2	0	0	2
AEE 816	Agricultural Cooperatives	2	0	0	2

THIRD SEMESTER

Course Code	Course Title	T	L	P	Units
AEE 899	Thesis Research Project				12

AEE 832	Extension Teaching and Communication	3	0	0	3
AEE 834	Advanced Social Work	3	0	0	3
AEE 836	Seminar	3	0	0	3
	ELECTIVES				2
	TOTAL				20

Electives

Course Code	Course Title	T	L	P	Units
AEE 808	Econometrics	3	0	0	3
AEE 812	Agricultural Finance	2	0	0	2
AEE 814	Agricultural Policy & Analysis	2	0	0	2
AEE 816	Agricultural Cooperatives	2	0	0	2

THIRD SEMESTER

Course Code	Course Title	T	L	P	Units
AEE 899	Thesis Research Project				12

8. COURSE SYNOPSSES

A. PGD

AEE 701: Concept, Principles and Practice of Agricultural Extension – 2 units

Philosophy, Objectives, Principles methods of Extension, application of Programme accountability to Extension programmes.

AEE 702: Agricultural Extension Training and Teaching Techniques – 2 units.

Extension Teaching methods, Agric research – Extension – Farmer linkage, Teaching and learning processes.

AEE 703: Introduction to Rural Sociology and Social Psychology in Extension – 3 units

Definition of rural sociology, basic principles of social psychology in Extension Rural//Social Organizations, Major Social Institutions and Processes.

AEE 704: Youth Development Programme in Extension – 3 units.

Types and Organisation of Rural youth and Clubs programme in Nigeria, Roles of Youths in Extension and rural development, Civic leadership among Youths.

AEE 705: Production and use of Audio Aids in Extension – 2 units.

Types of audio-visual instructions materials. Training in design development and presentation of audio visual aids, Principles and techniques of audio aids in Extension. Maintenance of audio-visual aids equipment and materials.

AEE 706: Diffusion and Adoption of Innovation - 2 units.

The meaning and elements of diffusion innovation decision process: Characteristics of innovation, adopter. categories, characteristics, adoption leadership, Case studies in Nigeria and other countries.

AEE 707: Social Change and Rural Development Strategies – 2 units

Overview of Theories of Development. The nature of social change measurement of change in rural communities, Economic aspect of rural social change.

AEE 708: Group dynamics and leadership programme in Rural Development – 2 units.

Nature and importance of group. Definition of group, Leadership in rural communities, Types, functions and role of leaders in Extension work.

AEE 709: Programme Planning Monitoring and Evaluation – 2 units

Extension programmes, definition and importance of programme planning in Extension.

AEE 710: Extension Administration – 2 units

Theories and models of management and Administration, The planning function and application of planning models of agricultural Extension.

AEE 711: Research and Statistical Method in Extension - 2 units.

Methods of data gathering , Formulating and Testing of hypothesis, Descriptive, inferential and productive statistics.

AEE 712: Training and Visit in Agriculture Extension – 2 units.

Definition and meaning of Training and Visit system, Scope and importance of Training and visit system in Technology transfer.

AEE 713: Extension Communication in Agriculture – 2 units.

Extension Communication principles and process of communication as applied to information disseminative in agriculture, Models of communication.

AEE 715: Introducing Technological Change – 2 units.

In Agric and Home Economics, Understanding technological changes, Characteristics of Technology, Generalization from diffusion research in Nigeria.

AEE 717: Women Development Programme – 2 units.

In extension and Rural Development, Role of women in Agriculture Extension and Rural Development Civic leadership roles of women in community development.

- AEE 721: Micro-Economics - 2 Units**
 Introduction (Definition and Scope) Methodology of Economics. Basic Economics Principles applied in agricultural production. The production function: Consumer behaviour Producer behaviour, Theory of competition, Equilibrium condition, welfare economics. Allocative mechanism.
- AAE 722: Macro-Economics - 3 units**
 Introduction; National Income; economic growth and development; inflation, demand for supply of money.
- AEE 723: Statistical Methods of Analysis – 2 units**
 Probability Theory, measure of location and dispersion-distribution, F-distribution, Chi distribution.
- AEE 724: Agricultural Finance – 3 units**
 Credit utilization, Decisions involved in borrowing funds by farmers, sources of finance, classification of farm credits, credit instruments, accounting principle involved in agriculture, Instrument appraisal; Capital budgeting, principle in planning enterprise combination, financial markets, and agricultural lending agencies.
- AEE 725: Principles of Farm Management – 3 units**
 Meaning of farm management, Economic Principles in farm Management, classification of farm management decision – making, Dynamics of farm management, Farm Management information system and analysis.
- AEE 726: Agricultural Marketing – 2 units**
 Marketing efficiency appraisal: Consumption and empirical analysis of demand; Marketing Management; International trade.
- AEE 727: Mathematics for Agriculturists – 3 units**
 Linear Equations and non linear equations; simultaneous Equations, Input-out analysis Integral and differential calculus as applied to agricultural activities.
- AEE 728: Agricultural Development and Policy - 3 units**
 Introduction, objectives of the development process, concepts of agricultural and Rural Development problem of comparative study of agricultural development strategies; Agricultural legislation and implications problems of development plans, Role of private and public sectors, Federal State and Local government and planning.
- AEE 729: Farm Records and Accounts – 2 units**
 Types and uses of farm records, Accounting Principles used in agriculture the income statement and its analysis, the balance sheet and its analysis, Enterprise/partial budgeting, cash flow statement and analysis, Valuation of farm stocks.
- AEE 730: Production Economics – 2 units**
 Theory of Production, production functions, supply functions, Production relations, and productivity, Farm cost function.
- AEE 731: Term Paper/Seminar – 2 units**
- AEE: 732: Introduction to Econometrics – 2 units**
 Meaning and methodology of economics, properties of econometric models, correlations and Regression Analysis, simultaneous equation model, Hypothesis testing.
- AEE 733: Research Methodology – 3 units**
 Introduction – Goals and areas of agricultural Economics and Extension Research, Steps in Research process: Data collection, Techniques, Sampling Methods; Questionnaire; and administration, Data processing techniques; Data analysis, presentation of research results, thesis format.
- AEE 734 Project Appraisal and Analysis – 2 units**
 Conceptual frame works project costs and benefits, measures of project worth; Economic aspects of project analysis, Farm investment analysis (FIA)
- AEE 735: Resource Economics – 2 units**
 Resource scarcity and economic growth; a model of optimal resource use, the problem of external cost land degradation, pollution the problem of non-exclusive resources, the problem of irreversibility the prospect of sustainability.
- AEE 736: Agribusiness Management – 2 units**
 Nature and type of agribusiness, initiating a new business, management leadership, resources to be managed, problems of agribusiness development in Nigeria.
- AEE 737: Labour and Personnel Management - 2 units**
 Introduction, special features of labour as a farm resource, objectives of labour management, farm output, enterprise efficiency, work study techniques, method (Analysis) work measurement, Job assignment problem, Man management.
- AEE 799 : PGD Research Project - 6 units**
 A research project is expected to be fully completed by the student under the supervision of an academic staff. A comprehensive report is to be submitted after the presentation of a Departmental Seminar.
- B. M.TECH**
- AEE 801: Research Methodology – 3 Units**
 Steps in the research process and their application; science and the scientific methods; delineation of research problems and development of research objectives, research designs in social research, data gathering with emphasis on field surveys, analyzing data and reporting results. Students are expected to demonstrate their understanding of research methodology by preparing a research proposal dealing with an economic problems.
- AEE 802: Statistical Theory and Analysis – 3 Units**
 Probability functions and probability laws; expectation of functions, random variables – independent and joint distribution and their expectation, central limit theory; analysis of variance, multiple comparisons, economic application of stochastic processes; markov chains.

AEE 804: Advanced Macroeconomic Theory – 3 Units

The mechanics of national income determination, consumption demand, the demand for money, investment demand, classical price determination, Keynesian employment level determination; monetarist growth theories and theories of technical progress; the macro-theory of distribution and disaggregated general equilibrium system and welfare theory.

AEE 805 Advanced Production Economics – 3 Units

Development and application of neoclassical theory of production and within the agricultural industry; theories of production, agricultural production functions, resource and returns to production in agricultural, agricultural cost and supply function, optimization of productions and farm equilibrium, farm planning and linear programming, farm planning under uncertainty.

AEE 806: Natural Resource Economics – 2 Units

Renewable and non-renewable resources; institutional consideration in resource economics, theoretical bases for rationality in agricultural resource allocation.

AEE 807: Operations Research – 2 Units

Techniques of quantitative tools in applied research, inventory models, product storage queuing theory, replacement models, allocative models, linear programming, transportation and assignment models, dynamic models; input-output analysis.

AEE 808: Econometrics – 3 Units

Models and model building; concepts of statistical inference, simple linear regression models, multiple linear progression model; violation of basic assumptions of regression and correlation, single equation problem. Formulation and estimation of special modes, models with restricted coefficients, distributed lag models, models with binary variables, non linear models; simultaneous equation models.

AEE 809: Agricultural Marketing – 2 Units

Theories of marketing, concepts and models marketing functions, processing and transportation models, etc. marketing institutions; market structure, conduct and performance, prices, margins, economies of scale, consumer economics and demand analysis.

AEE 810: Seminar – 2 Units

Seminar topics in areas of agricultural economics of economics. Each candidate is expected to make two seminar presentations.

AEE 811: Agricultural Planning and Appraisal – 2 units

Meaning of projects appraisal, relationship between appraisal and planning, the distinction between financial and economic appraisal; tools of project analysis, the arithmetic of project appraisal; issues in the appraisal of agricultural projects, agricultural plan implementation.

AEE 812: Agricultural Finance – 2 Units

Review of capital and investment theory analysis of short-term working capital needs, cash budgeting procedures, treatment of uncertainty in investment decisions; proforma statements, types of short-term loan arrangements, short-term asset management, emphasis on relevant examples in Nigeria.

AEE 814: Agricultural Policy Analysis – 2 Units

Theory of economic development, policies for economic development and characteristics of economically less developed countries and areas; analytical treatment of governmental policies and programmes affecting Nigerian agriculture, evaluation of agricultural policy in a developing economy; comparative agricultural development; individual country studies and seminars.

AEE 825: Programme Planning and Evaluation – 3 units

Principle and concepts of Programme Planning in Extension Basic steps in programme Development Determination of needs Clarification of problems Setting of objectives. Development of a plan Obtaining staff and Clientele commitment to action Programme implementation and appraisal

AEE 827: Extension Administration – 3 units

Theory and Practice of Administration Organisational Structure as applied to Agric. Extension Services in Nigeria Personnel Management Fiscal control Assessment of Extension work accomplishment.

AEE 828: Participatory and Rural Development Approaches - 3 units

Identification of needs Past and Present rural Development Strategies Dimensions of rural Extension Extension – Research Linkages (Terminology transfer) Participatory approach in Rural Development Extension models.

AEE 829 : Advanced Rural Sociology – 3 units

General Sociology Theory Analysis of Social System Relation of individual to his social environment Group Dynamics Leadership patterns Social change and Community Organisation. Special Topics in Rural Sociology

AEE 830: Measurement and Scaling Techniques in Extension - 3 units

Meaning and scales of measurement Factors influencing the choice of Appropriate parametric tests Principles of Test construction – Statistical concepts Item analysis. Types and measurement of Reliability and Validity Techniques for attitude scale construction method of paired comparison Equal – Appearing intervals Successive intervals Summated Ratings Scalogram analysis.

AEE 831: Advanced Psychology for Extension Personnel - 2 units

Concepts of Human Development Intelligence Individual Difference Teaching learning process Motivation to Extension Education.

AEE 832 Extension Teaching and Communication Methods – 2 units

Setting up effective learning situation in Rural Areas Motivation principles in adult learning. Communication and diffusion process Practice of selective Extension methods including Demonstrations, meetings, tours, exhibits and audio visual aids.

AEE 834: Advanced Social Work - 2 units

Concept of Social work Strategies for Communal Mobilisation for Developmental projects. Social Work Techniques and Appraisal Methods Social Work Designs Social work in Health Nutrition Environmental Management Education etc. Evaluation in Social Work.

AEE 899 : Master's Thesis Research Project - 12 units

An original investigation in a title approved by the School of Postgraduate Studies. A thesis must be completed with significant contribution to knowledge. The thesis shall be defended in an open and oral examination organized by the School of Postgraduate Studies.

C. Ph.D

AEE 999: Ph.D Research Project

An original investigation in a title approved by the School of Postgraduate Studies. A thesis must be completed with significant contribution to knowledge. The thesis shall be

LIST OF ACADEMIC STAFF

S/N	NAME	POST	AREA OF SPECIALIZATION
1	Prof. T.T. Amos	Professor	Production Economics
2	Prof. E.A. Aderinola	Professor	Farm Management
3	Prof. A.G. Daramola	Professor	Production Economics
4	Prof. I. Ajibefun	Professor	Production Economics
5	Prof. S.O. Ojo	Professor	Production Economics
6	Prof. A.E. Oguntade	Professor	Environmental Economics
7	Prof. J.A. Afolabi	Professor/HOD	Marketing
8	Prof. T.E. Mafimisebi	Professor	Marketing
9	Prof. J.A. Folayan	Professor	Marketing
10	Dr. J.O. Oseni	Reader	Marketing
11	Dr. O.O. Akinrinola	Senior Lecturer	Policy Analysis
12	Dr. (Mrs) S.F. Arifalo	Lecturer I	Environmental Economics
13	Dr. O.A. Thompson	Lecturer I	Environmental Economics
14	Dr. D. Awolala	Lecturer II	Policy Analysis
15	Dr. (Mrs) A.A. Obisesan	Lecturer II	Welfare Environment
16	Dr. I.O. Ogunwande	Lecturer II	Farm Management
17	Dr. W.M. Ashagidigi	Lecturer II	Welfare Economics

9.1.4 DEPARTMENT OF CROP, SOIL AND PEST MANAGEMENT (CSP)

1. PROGRAMMES OFFERED

- (a) Postgraduate Diploma (PGD)
- (b) Master of Agricultural Technology (M.Agric. Tech.)
- (c) Doctor of Philosophy (Ph.D)

2. AVAILABLE OPTIONS / SPECIALIZATION

- (a) PGD in Crop, Soil and Pest Management
- (b) M.Agric. Tech. with specialization in:
 - (i) Crop Management Technology
 - (ii) Soil Management Technology
 - (iii) Pest Management Technology
- (c) Ph.D with specialization in:
 - (i) Crop Management Technology
 - (ii) Soil Management Technology
 - (iii) Pest Management Technology

3. PHILOSOPHY AND OBJECTIVES

The objective of postgraduate programmes in the Department is to train professionals in Crop, Soil and Pest Management, who will serve in both private and public sectors of the economy.

The philosophy of the programme is to provide functional education for postgraduate students who eventually after the training will be job makers and job creators, who in addition will be trainers of top level academic and masters of industrial sector.

4. ADMISSION REQUIREMENTS

(a) Postgraduate Diploma (PGD)

- (i) Candidates with a Higher National Diploma (HND) in agriculture or allied discipline at not less than Lower Credit level.
- (ii) Candidates with a Third Class and above in any area of Agriculture or related disciplines from recognized Universities.

(b) Master of Agricultural Technology (M.Agric Tech.) in Crop, Soil & Pest Management

- (i) Candidates must possess five (5) Credits at WASCE or SSCE or GCE at a maximum of two sittings with credit in English Language, Chemistry, Biology or Agricultural Science, Mathematics or Statistics and Physics.
- (ii) Candidates with PGD (Upper Credit or Distinction).
- (iii) Candidates with first degree in Agriculture and related disciplines with a minimum of Second Class Lower Division.

(c) Doctor of Philosophy (Ph.D)

Candidates with M.Agric. Tech./M.Tech./M.Sc. in Agriculture and related disciplines from other recognized institutions with a CGPA of not less than 3.50 or 60% in the overall result. Where applicable, the candidate may be required to score not less than 60% in the oral thesis examination.

5. DURATION OF THE PROGRAMME

(a) PGD

The academic programme, which will be on a part-time basis, includes a course work and a supervised research project and both will cover a minimum period of three (3) semesters.

(b) M.Agric. Tech.: Full time 18 months - 24 months

(c) Ph.D:

Full time: 36 months - 48 months

Part time: 48 months - 72 months

(In all cases, Senate may extend the duration as it deems fit and necessary. On application, candidates may be granted extension on programme duration subject to approval of Senate).

6. REQUIREMENTS FOR GRADUATION

(a) PGD

To be eligible for the award of PGD, a candidate must have passed 30 units of course work, including 6 units of Research Project.

(b) M.Agric. Tech.

M.Agric. Tech. in the area of specialization is awarded to a candidate who has

- (i) Accumulated a Total Load Unit (TLU) of 36 including 12 units of thesis Research, 18 units of 6 compulsory or core courses and 6 units of Electives.
- (ii) successfully presented a minimum of two (2) Departmental Research project seminars
- (iii) Successfully defended the Research Thesis in the specialized area at an oral examination organized by the School of Postgraduate Studies (SPGS).

(c) Ph.D

A candidate is awarded a Ph.D degree after he has successfully:

- (i) Completed any prescribed course work;
- (ii) Presented three (3) Departmental Research Project Seminars;
- (iii) Defended the Research Thesis in a specialized area at an oral examination organized by SPGS.

7. COURSE OUTLINE

(a) PGD

FIRST SEMESTER

Course Code	Course Title	T	L	P	U
CSP 701	Biometry	2	0	0	2
CSP 703	Soil & Plant Analysis	1	0	3	2
CSP 705	Plant Pathology	1	0	3	2
CSP 707	Entomology	1	0	3	2
CSP 709	Soil Classification & Survey	2	0	3	3
	TOTAL	7	0	12	11

SECOND SEMESTER

Course Code	Course Title	T	L	P	U
CSP 702	Principles of Crop Husbandry	1	0	0	1
CSP 704	Soil Fertility & Chemistry	3	0	3	3
CSP 706	Weed Biology & Ecology	2	0	3	2
CSP 708	Cytogenetics & Plant Breeding	3	0	3	3
CSP 710	Information Retrieval	2	0	0	2
	TOTAL	11	0	9	11

THIRD SEMESTER

Course Code	Course Title	T	L	P	U
CSP 799	PGD Research Project	0	0	0	6

(b) M.Agric. Tech

FIRST SEMESTER

Course Code	Course Title	T	L	P	Units
CSP 801	Statistics & Agric Experimentation	2	0	0	2
CSP 803	Agroclimatology & Plant Physiology	2	0	0	2
CSP 805	Advanced Plant Nutrition	2	0	3	3
CSP 807	Advanced Cytogenetics & Plant Breeding	2	0	0	2
CSP 809	Advanced Crop Husbandry	2	0	0	2
	TOTAL	10	0	3	11

SECOND SEMESTER

CROP MANAGEMENT OPTION

Course Code	Course Title	T	L	P	Units
CSP 802	Advanced Seed Production Technology	2	0	0	2
CSP 804	Applied Horticulture	2	0	0	2
CSP 806	Soil/Plant Relations	2	0	3	3
CSP 814	Integrated Pest Management	2	0	0	2
CSP 818	Methods Of Soil & Plant Analysis (Practicals)	2	0	3	3
CSP 832	Advanced Soil Fertility & Fertilizer Use	2	0	3	3
	TOTAL	12	0	9	15

SOIL MANAGEMENT OPTION

Course Code	Course Title	T	L	P	Units
CSP 802	Advanced Seed Production Technology	2	0	0	3
CSP 808	Advanced Entomology	2	0	3	3
CSP 810	Advanced Plant Pathology	2	0	3	3
CSP 812	Advanced Weed Science	2	0	3	3
CSP 814	Integrated Pest Management	2	0	3	3
CSP 816	Advanced Crop Protection	2	0	3	3
	TOTAL	12	0	15	18

THIRD SEMESTER

Course Code	Course Title	T	L	P	Units
CSP 899	Master Thesis Research Project	0	0	0	12
	TOTAL	0	0	0	12

(c) Ph.D CSP 999 Doctoral Research Project

8. COURSE SYNPOSSES

A. PGD

CSP 701: Biometry - 3 Units

Analysis of variance. Regression and correlation. Multiple and curvilinear regression. Analysis of frequencies, Field experimental design. Data analysis using statistical software packages: SPSS, Genstat, Stata etc.

CSP 702: Principles of Crop Husbandry - 2 Units

Principles of perennial crop production including establishment, nutrition, pests and diseases, Principles of production of short-term crops with reference to cereals, root and tuber crops, vegetables and miscellaneous crops.

CSP 703: Analytical techniques for Soil and Plant - 2 Units

Determination of soil physical properties. Sample collection and preparation. Determination of organic matter, N, P, K, Ca and Mg. Chemical analysis of plant tissue for elements (Laboratory).

CSP 704: Soil Fertility and Chemistry - 3 Units

Plant growth requirements. Cation exchange capacity. Soil acidity and liming. Plant nutrients and their chemistry in soil. Diagnosing nutrient deficiencies. Routine soil testing, fertilizers.

CSP 705: Plant Pathology - 2 Units Microorganisms affecting field crops. Diseases of field crops (bacteria, fungi, virus, nematodes), their identification, significance and control.	Health; Seed Marketing and Distribution; Economics of seed production; Seed certification and Legislation; Plant Property Rights, Review of Seed production in Nigeria.
CSP 706: Weed Biology and Ecology - 2 Units Characteristics of weeds. Classification, distribution and factors favouring spread of weeds. Principles of weed ecology. Weed-crop interactions including competition and factors influencing competition. Allelopathy and types.	CSP 803: Agro-Climatology and Plant Physiology - 3 Units. Elements of weather and climate, Effects of radiation on plants, Photoperiodic responses in plants, Effects of temperature on soil and plants, energy and water exchanges in the soil-plant atmosphere continuum, Consumptive water use (evapotranspiration) by plants and measurement approaches, Water balance, Water and yield relationships.
CSP 707: Entomology - 2 Units Types of crop pests. Pest damage. General principles of insect control. Vertebrate pests control. Insecticides; their mode of action and resistance of pests to insecticides.	CSP 804 Applied horticulture - 3 Units General nursery techniques; Types of Parks and Garden (Public, Recreational and Sporting facilities); Their nature, management and administration, Techniques of Production and Uses and handling of Ornamental Plants; principle and Elements, Acceding, Diversity, Appearance and Economy in Landscape Design and Design Processes,; Principles of vegetable Production, Post Harvest Physiology of Fruits and Vegetables.
CSP 708: Cytogenetics and Plant Breeding - 3 Units Cell organization. Variation and chromosome number. Chromosome aberration and structural modifications. Mutation. Cytoplasmic inheritance. Incompatibility and plant breeding. Male sterility. Polyploidy. Methods of plant improvement	CSP 805: Advanced Plant Nutrition - 3 Units Sources and nature of plant nutrients, Problem of inadequate plant nutrition, Mechanisms of Nutrient availability and uptake, Role of soil organic matter and clay. Biological nitrogen fixation, Integrated nutrient supply, Plant nutrient sources. Chemistry of phosphorus and Potassium in soil.
CSP 709: Soil Survey and Classification - 3 Units Factors of soil formation. Soil survey methods. Definition of mapping units. Classification systems. Soil description. Classification of Nigerian soils. Land capability classification. Field and laboratory exercises.	CSP 806: Soil-Plant Relations - 3 Units States of water in soil, Water movement through the soil-plant atmosphere continuum, Development and functioning of plant roots, Movement and uptake of nutrients by plant roots, Association between plants and microorganisms, Energy and water exchanges between the plant and atmosphere, Development and significance of water deficits.
CSP 710 Information retrieval - 2 Units Paper and oral presentation of selected topic in any aspect of crop production.	CSP 807: Advanced Cytogenetics and Plant Breeding - 3 Units Cell and its structure, Mitosis; meiosis and Gamete Formation; Genetic materials, Properties and Replication; Variation in Genome Structure; Mendelian, Molecular and Population genetics; Vegetative Propagation; Artificial Hybridisation; Pollen Transfer, protoplasmic Fusion and Gene Manipulation; Application of principles of Population Genetics to Plant Breeding.
CSP 799: PGD Research Project - 6 Units Research project relevant to individual candidate's area of interest or specialization e.g. Crop Management, Crop Pest Management and soil Management.	CSP 808: Advanced Entomology - 3 Units Basic insect morphology; physiology and ecology, Insect systematic. Research advances in insect morphology, physiology and Ecology. Insect Biochemistry and Biotechnology.
B. M.AGRIC. TECH.	
CSP 801: Statics and Agricultural Experimentation - 3 Units Review of basic statistical concepts, probability,. Samples from a Normal distribution. Comparisons involving two sample means, principles of Experiment Design, Analysis of variance, Multiple Comparisons, Linear Regression and Correlation, Multiple and Partial Regression and Correlation, factorial Experiments, Analysis of Covariance, Curvilinear relations, Analysis of counts, Non-parametric statistics, Probit analysis, Data analysis using statistical software packages, - EXCEL, SPSS, Genstat, Suplus etc. filed experimental designs.	CSP 809: Advanced Crop Husbandry - 2 Units The plant system, Soil and crop nutrition, Agronomic Practices and Systems, Crop pests and pathogens, principles of
CSP 802: Advanced Seed Production Technology - 3 Units Seed biology, Structure and chemical composition, morphology, seed germination and seed dormancy, principles of seed production, Production technologies for various seed; Seed processing and storage technology, Seed Testing and	

plantation/perennial crop production, principles of annual crop (short term) crop production (cereals, root and tuber crops, sugar cane, oilseeds and pulses, tobacco fibre and vegetable crops).

CSP 810: Advanced Plant Pathology - 3 Units

Plant Pathology – its history and progress/advances, Some concepts and definition; Agents of non-infectious diseases, inoculum and Inoculum potential; Nutrition of plant pathogens; Enzymes and Plant diseases; Disease resistance in Plants; Genetics of Host-Plant resistance in plants; Genetics of Host-Parasite Interactions; Physiology of the Diseased Plants; Pathological techniques; Control of plant diseases.

CSP 812: Advanced Weed Science - 3 Units

Weed biology and ecology; Weed management strategies and environmental impact; physiology and biochemistry of herbicide selection; Research methods; Pesticide toxicology

CSP 814: Integrated Pest Management (IPM) – 3 Units

Historical perspectives, Definition and explanation of terms, Components or, instruments of IPM, Economic consideration in IPM, Implementation of IPM, Hindrances to IPM in Developing countries, Examples of IPM in crop protection – insects, diseases and weeds.

CSP 816: Advanced Crop Protection - 3 Units

Concepts of Pest, Pathogenicity and Weediness, Economic levels, Sampling, monitoring and forecasting, Yield loss assessment, Components of insect pest, diseases and weed management, Cultural control, ecological control, chemical control, physical and mechanical controls. Interference methods, Host-plant resistance, Quarantine, Legislation and politics, Integrated Pest Management (IPM), Formulations, Insecticides, Fungicides, Herbicides and Nematicides, Principles of Stored Products Pest Control.

CSP 818: Methods of Soil and Plant Analysis (Practicals) - 3 Units

Sample preparation. Extraction, Instrumentation (flame photometer, spectrophotometer, Atomic absorption, spectrophotometer). Determination of macro and micro elements.

CSP 820: Soil Genesis and Classification - 3 Units

Factors of soil formation. Soil survey methods. Definition of mapping units. Classification systems, soil description,

Classification of Nigeria soils, Land capability classification, Field and laboratory exercises.

CSP 824: Mineralogy - 3 Units

Rocks and minerals, Soil colloids, Clay mineralogy, Introduction to crystal chemistry Atomic models of mineral and crystal, Introduction to non silicates.

CSP 826: Advances Soil Physics - 3 Units

Effects of soil physical properties on plant, soil structure, texture, consistency, bulk density, Temperature, soil water relationships, factors affecting infiltration, saturation flow, Unsaturated flow, vapour transfer, water content as a measure of matric suction.

CSP 828: Advanced Soil Management and Conservation - 3 Units

Soil resources of the tropics and other properties, soil degradation in the tropics, Principles of soil resources management, shifting cultivation, ecological compatible land clearing, Conservation tillage, mulching farming, cover crops, agroforestry, Erosion control measures.

CSP 830: Soil Microbiology and Biochemistry (Optional) - 2 Units

Bacterial metabolism, mineralization and immobilization, nitrification and denitrification, Fe Bacteria, symbiotic Nitrogen fixation, cycle of elements in soil, Microbial Ecology, Rhizosphere.

CSP 832: Advanced Soil Fertility and Fertilizer Use (Optional) - 2 Units

Inorganic fertilizers, Fertilizer application methods, fertilizer calculations, Soil testing, Soil Acidity and alkalinity, liming, Nutrient cycling through organic sources.

CSP 899: Master Thesis Research Project - 12 Units

Research project relevant to the option chosen by individual candidate in consultation with the Supervisor e.g. Crop Management, Crop Pest Management and Soil Management.

C. Ph.D

CSP 999: Doctoral Research Project

Research project relevant to individual candidate's area of specialization e.g. Plant Physiology, Crop Entomology, Soil Fertility Management, Weed Science and Plant Breeding.

LIST OF ACADEMIC STAFF

S/N	NAME	QUALIFICATION	RANK	AREA OF SPECIALIZATION
1	Akinyele B. O	B.Sc., M.Sc., Ph.D (Ilorin)	Professor & Head	Plant Genetics & Biosystematics
2	Ojeniyi S.O.	B.Sc. (Ife), M.Sc., (Ibadan),Ph.D (Adelaide)	Professor	Soil Fertility Management
3	Ofuya T.I.	B.Sc., Ph.D (Ife)	Professor	Crop Entomology
4	Olufolaji D. B.	B.Sc., M.Phil.(Ibadan), Ph.D (Ilorin)	Professor	Plant pathology
5	Smith M.A.K.	B.Sc., M.Sc., Ph.D (Ibadan)	Professor	Weed Science
6	Aladesanwa R.D.	M.Sc., Ph.D (Moscow)	Professor	Chemical Weed Control/ Crop Protection
7	Agele S.O.	B.Agric.Tech.(Akure) M.Sc. (Gent.)Ph.D (Akure)	Professor	Soil-plant Relations/ Plant Physiology
8	Adekayode F.O.	B.Sc., M.Sc.(Ife), Ph.D (Akure)	Professor	Soil Management
9	Awodun M.A.	B.Tech. (Owerri), MBA (Ado-Ekiti), M. Agric. Tech., Ph.D (Akure)	Reader	Agronomy/Plant Nutrition
10	Ewulo B.S.	B.Tech. (Abeokuta), M.Agric. Tech., Ph.D (Akure)	Reader	Soil Management
11	Odiyi A.C.	B.Sc, MSc. (Nsukka), Ph.D (Akure)	Senior Lecturer	Plant Breeding/Genetics
12	Aiyelari O.P.	B.Sc., M. Agric., Ph.D (Ibadan)	Senior Lecturer	Agronomy/Farming Systems
13	Okunlola A. I.	B.Sc. M.Sc., (Ibadan), Ph.D (Akure)	Senior Lecturer	Horticulture
14	Oni M. O.	B.Sc., M. Sc. (Ilorin), Ph.D (Akure)	Senior Lecturer	Crop entomology
15	Idoko J.E.	B.Sc., M. Agric. Tech. (Akure)	Senior Lecturer	Crop entomology
16	Adebayo, R. A.	M. Phil. (Accra), Ph.D (Ilorin)	Lecturer I	Crop Entomology
17	Famuwagun I.B.	B. Tech., M. Agric. Tech, Ph.D (Akure)	Lecturer I	Soil Plant Relations
18	Adejoro, S. A.	M. Agric. Tech, Ph.D (Akure)	Lecturer I	Soil Microbiology and Biochemistry
19	Adeyemo A. J.	M. Agric. Tech (Akure), Ph.D (Brazil)	Lecturer I	Soil Microbiology
20	Fayeun L. S.	B.Sc., M.Sc. (Akure), Ph.D (Abeokuta)	Lecturer II	Plant Breeding and Genetics
21	Ajai M. A.	B.Sc. (Ilorin), M. Agric. Tech. (Akure)	Lecturer II	Plant Pathology

9.1.5 DEPARTMENT OF ECOTOURISM AND WILDLIFE MANAGEMENT (EWM)

(1)	PROGRAMMES OFFERED		
(a)	Postgraduate Diploma		of national biodiversity, ecotourism destinations and national parks.
(b)	Masters in Ecotourism and Wildlife Management (M. Agric. Tech.)	4.	
(c)	Doctor of Philosophy (Ph.D.)	(a)	
(2)	AVAILABLE OPTION	(i)	
(a)	Postgraduate Diploma (PGD) in Ecotourism and Wildlife Management		ADMISSION REQUIREMENTS
(b)	M. Agric. Tech. with options in (i) Wildlife Ecology and Range Management (ii) Biodiversity Conservation and Management (iii) Wildlife Nutrition and Production (iv) Ecotourism and Hospitality Management	(ii)	Postgraduate Diploma (PGD) Candidates with a Higher National Diploma (HND) in Wildlife Management, Ecotourism Management, Tourism, Environmental Management, Forestry or allied disciplines at not less than Lower Credit level.
(c)	Ph.D. with specialization (i) Wildlife Management (ii) Range Management (ii) Biodiversity and Conservation (iii) Wildlife Nutrition and Production (iv) Ecotourism Management (v) Hospitality Management	(b)	Candidates with a Third Class and above in Ecotourism and Wildlife Management or related disciplines from recognized Universities.
		(i)	Master of Agricultural Technology (M. Agric. Tech.) in Ecotourism and Wildlife Management. Candidates with PGD (Upper Credit or Distinction) in Ecotourism and Wildlife Management.
		(ii)	Candidates with first degree in Ecotourism, Wildlife or Wildlife combined or botany, zoology, biology or other related disciplines with a minimum of Second Class Lower Division.

(3) PHILOSOPHY AND OBJECTIVES

The objective of postgraduate programmes in Ecotourism and Wildlife Management is to provide functional education for postgraduate students who eventually after the training will become job makers and job creators, who in addition will be trainers of top level academics and Masters of industrial, environmental and conservation sector.

The academic programme is focused towards advancement of knowledge in Ecotourism, Environmental and Biodiversity Management as well as Wildlife Management techniques for food production and environmental sustainability.

Programme Objectives

The major objectives of the programme are to:

- (i) provide advanced education and training in the Science and Technology of Wildlife resources, environmental impact assessment, ecotourism and biodiversity management to cater for the high level manpower requirement of the nation;
- (ii) provide functional education for the postgraduate students at Master and Postgraduate Diploma levels who will eventually become job makers;
- (iii) provide opportunity for problem solving research students focused on wildlife production and utilization, ecotourism and provision of the necessary raw materials for the national tourism industries in this sub sector;
- (iv) offer to the public the results of research and foster the practical application of these results; and
- (v) provide advanced studies and higher training in environmental impact assessment, management

(c) Doctor of Philosophy

Candidates with M. Agric. Tech. / M. Tech./M. Sc. in Ecotourism, Wildlife or Wildlife combined or botany, zoology, biology or other related disciplines from other recognized institutions with a CGPA of not less than 3.50 or 60% in the overall result. Where applicable, the candidate may be required to score not less than 60% in oral thesis examination.

(5) DURATION OF THE PROGRAMME

(a) PGD

The academic programme, which will be on part-time basis, includes a course work and a supervised research project and both will cover a minimum period of three (3) semesters.

(b) M. Agric. Tech.:

Full time: 18 months
Part time: 24 months

(c) Ph.D.:

Full time: 36 months
Part time: 48 months

(On application, candidates may be granted extension on programme duration subject to approval of Senate).

6. REQUIREMENTS FOR GRADUATION

(a) Postgraduate Diploma

To be eligible for the award of PGD, a candidate must have passed 36 units of course work, including 6 units of Research Project.

(b) M. Agric. Tech.

M. Agric. Tech. in the area of specialization is awarded to a candidate who has:

- (i) accumulated a Total Load Unit (TLU) of 36 including 12 units of Thesis Research and 24 course units;
- (ii) successfully presented a minimum of two (2) Departmental Research Project Seminars;
- (iii) successfully defended the Research Thesis in the specialized area at an oral examination organized by the School of Postgraduate Studies (SPGS).

(c) Ph.D

A candidate is awarded a Ph.D degree after he has successfully

- (i) Completed any prescribed course work;
- (ii) presented three (3) Departmental Research Project Seminars;
- (iii) defended the Research Thesis in a specialized area at an oral examination organized by the SPGS

7. COURSE OUTLINE

(a) PGD

FIRST SEMESTER

Course Code	Course Title	T	L	P	Units
EWM 751	Principle of Ecotourism	0	3	0	3
EWM 753	Wildlife Domestication and Ranching	0	2	1	3
EWM 755	Research Methods and Statistics	0	3	0	3
EWM 757	Ecotourism Event Management	0	3	0	3
EWM 759	Rainforest and Savanna	0	2	1	3
EWM 761	Field Trip	0	0	0	2
TOTAL		0	13	2	17

SECOND SEMESTER

Course Code	Course Title	T	L	P	Units
EWM 750	Seminar	0	0	0	2
EWM 752	Zoo and Museum Management	0	2	0	3
EWM 754	Ecotourism Products, Marketing and Publicity	0	3	0	3
EWM 756	Advanced Wildlife Ecology	0	2	1	3
EWM 758	Natural Resources Conservation	0	3	0	3
EWM 760	Conflict Resolution in Wildlife and Ecotourism Management	0	0	0	3
TOTAL		0	10	1	17

THIRD SEMESTER

Course Code	Course Title	T	L	P	Units
EWM 799	PGD Research Project	0	0	0	6
TOTAL		0	0	0	6

(b) M.TECH

FIRST SEMESTER

Core Courses

Course Code	Course Title	T	L	P	U
FWT 801	Statistics and Experimental Design	0	2	0	2
EWM 803	Habitat management	0	1	3	2
EWM 805	Animal Ecology	0	2	0	2
EWM 807	Animal Capture Techniques	0	1	3	2
EWM 809	Field Trip	0	0	6	2
TOTAL		0	6	12	10

Wildlife Ecology and Management Option

Course Code	Course Title	T	L	P	Units
EWM 811	Range Ecology and Management	0	1	3	2
EWM 813	Population Dynamics	0	2	0	2
EWM 815	Wetland and Avian Conservation	0	1	3	2
TOTAL		0	4	6	6

Biodiversity Conservation and Management Option

Course Code	Course Title	T	L	P	Units
EWM 815	Wetlands and Avian Conservation	0	2	0	2
EWM 821	Environmental Survey and Data Indices Production	0	1	1	2
EWM 823	Land Use Planning for Conservation	0	2	0	2
TOTAL		0	5	1	6

Wildlife Nutrition and Production Option

Course Code	Course Title	T	L	P	Units
EWM 809	Range Ecology and Management	0	1	3	2

EWM 831	Advanced Wildlife Nutrition	0	2	0	2
EWM 833	Feed Formulation Technology	0	1	3	2
EWM 835	Wild Animal Resources and Utilization	0	2	0	2
	TOTAL	0	6	6	8

Wildlife Ecology and Management Option

Course Code	Course Title	T	L	P	Units
EWM 810	Advanced Zoo and museum Management	1	1	0	2
EWM 812	Conservation genetics	0	2	0	2
EWM 814	Remote sensing and GIS	0	1	1	2
	TOTAL	1	4	1	6

Ecotourism and Hospitality Management Option

Course Code	Course Title	T	L	P	Units
EWM 813	Wetlands and Avian Conservation	0	2	0	2
EWM 841	Ecotourism and Recreational Planning	0	2	0	2
EWM 843	Park and Environmental Interpretation	0	2	0	2
EWM 845	Advanced Ecotourism Marketing and Publicity	0	2	0	2
	TOTAL	0	8	0	8

Biodiversity Conservation and Management Option

Course Code	Course Title	T	L	P	Units
EWM 820	Community Participation in Renewable Resource Management	0	2	0	2
EWM 822	Eco-toxicology and Waste Management	0	2	0	2
EWM 824	Management of Endangered Species	0	2	0	2
	TOTAL	0	6	0	6

Wildlife Nutrition and Production Option

Course Code	Course Title	T	L	P	Units
EWM 830	Wildlife Diseases and Parasitology	0	2	0	2
EWM 832	Animal Physiological Adaptation	0	2	0	2
EWM 814	Mini-livestock Production	0	1	3	2
EWM 836	Apiculture	0	1	3	2
	TOTAL	0	6	6	8

Electives

Course Code	Course Title	T	L	P	Units
EWM 817	Conservation Biogeography	0	2	0	2
EWM 819	Protected Area Planning and Management	0	2	0	2
	TOTAL	0	4	0	4

SECOND SEMESTER

Course Code	Course Title	T	L	P	Units
EWM 800	Seminar	0	0	6	2
EWM 802	Research Techniques in Ecotourism and Wildlife Management	0	1	3	2
EWM 804	Wildlife Policy and Administration	0	2	0	2
EWM 806	Wildlife Extension, Communication and Community Development	0	1	1	2
	TOTAL	0	4	6	8

Electives

Course Code	Course Title	T	L	P	Units
EWM 816	Natural Resource Economics and Enterprise Development	0	2	2	2
EWM 818	Game Ranching and Domestication	0	1	3	2
EWM 826	Environmental Impact assessment and Auditing	0	1	3	2
	TOTAL	0	4	8	6

THIRD SEMESTER

Course Code	Course Title	T	L	P	Units
EWM 899	Master's Thesis Research Project	0	0	18	12
	TOTAL	0	0	18	12

9. COURSE SYNOPSIS

POSTGRADUATE DIPLOMA IN ECOTOURISM AND WILDLIFE MANAGEMENT

EWM 750: Seminars (2 Units)

Students will be expected to carry out literature review on recent developments in an area of current interests in the field of Ecotourism and Wildlife Management. The area of the review should not be directly related to the student's research project. An oral presentation of the review will be presented at an organized departmental seminar. The review must be typed, bound and submitted to the department for assessment.

EWM 751: Principles of Ecotourism (3 Units)

Scope and meaning of ecotourism, components of ecotourism, sectors of ecotourism, elements and indicators of ecotourism , purpose of ecotourism, benefits and importance of ecotourism, The course examines the emerging area of eco-tourism in both developing and developed nations. The issues discussed involve the purpose of eco-tourism, importance to GDP, infrastructure demands, return on investment, and the possible financial strains and returns to local areas. The course provides a thorough examination of potential benefits as well as liabilities of eco-tourism to the region, indigenous population, and nation as well as who can gain and who can lose from such undertakings.

EWM 752: Advanced Zoos and Museum Management (3 Units)

Planning and Design of zoological gardens, capture and transportation of wild animals. Health, handling and care of wild animals in captivity. Amusement infrastructures in zoos and nature interpretation. Feeding of animals, zoo sanitation. Control of visitors. Collection, preservation and exhibition of wild animal specimens in museums for educational and recreational purposes. Financial control and personnel management. Problems and prospects of zoo and museum management in Nigeria.

EWM 753: Wildlife Domestication and Ranching (3 Units)

Characteristics features in various wild animal species that qualify them for meat production. Captive breeding and propagation of the identified animal species of Nigerian origin. Breeding systems; selection methods, sex determination; Establishing and development of Cross-breeding programme; farm animal domestication and ranching of the ungulate with potentials for meat and hide production.

EWM 754: Ecotourism Products, Marketing and Publicity (3 Units)

Products: Identifying products, developing partnerships, tapping local knowledge, research, zoning, policies and guidelines, educating and marketing. Practices:

transportation, facilities (reduce, replace, re-use, recycle), services (types, activities and code of ethics), eco-labeling and green-washing, case studies of ecotourism in practice: best practice guidance, certification etc. Use of different media in publicity namely: newspaper, bulleting, radio and television; meeting with different interest groups in the country i.e. cooperative society; churches and student organization; workshops; seminars and public lectures. Methods and techniques of information generation and analysis in ecotourism publicity and marketing. Factors affecting market fluctuation.

EWM 755: Research Methods and Statistics (3 Units)

Introduction to nature of scientific enquiry, concepts of causation, literature review and the research question; use of the library and the internet for literature search. Conceptualisation and measurement; data collection instruments, validity, research study designs, threats to validity; selection of study subjects and size. Planning for data collection , management and analysis. Research ethics; research project management; the research proposal; characteristics of empirical research, the analysis of data graphically and statistically. Interpretation of research results, report writing and presentation. Evaluation of research performance.

EWM 756: Advanced Wildlife Ecology (3 Units)

Concepts of ecosystem, natural communities and population ecology, population dynamics, ecological density. Parameters affecting population density; Natality rate - nutrition, age structure, environmental factors. Population interaction such as predator-prey interactions

EWM 757: Ecotourism Event Management (3 Units)

What is ecotourism event? Aims of ecotourism event, importance of ecotourism events in meeting the goals of ecotourism in protected areas, ecotourism events types, measuring values of ecotourism and event, uses of ecotourism events as interpretive and social marketing tools, ecotourism event themes and models, planning and staging ecotourism events, conceptualizing ecotourism events, guidelines for planning and staging ecotourism events.

EWM 758: Natural Resources Conservation (3 Units)

Foundational theory of community-based natural resources management, history, empirical evidence of community-based management of forest, wildlife and water resources globally. Case studies on community governance and market-based initiatives. Principles of community-based ecotourism, community based-ecotourism management, monitoring the success and impacts of community-based ecotourism, case studies of successful community-based ecotourism projects, challenges and opportunities for local participation

EWM 759: Rainforest and Savanna (3 Units)

The terrestrial ecosystems of Nigeria; distribution and function. The structure and dynamism of rainforest ecosystem of Nigeria. The savannas as a major biogeographic region:

Savanna woodlands, Savanna parklands, Savanna grasslands, Low tree and shrub savannas, Thicket and scrubs, Land use in forest and savanna environment. Distribution of wild herbivores within the forests and savannas.

EWM 760: Conflict Resolution in Wildlife and Ecotourism Management (3 Units)

Definition, history, global trend, typology, causes, consequences for humans and wildlife conservation, human-wildlife conflict management, decisional framework. Foundational theory of community-based natural resources management, history, empirical evidence of community-based management of forest, wildlife and water resources globally. Case studies on community governance and market-based initiatives.

EWM 761: Field Trip (2 Units)

Students will be expected to undergo a week training which involves participation and exposure to ecotourism and wildlife industries and parks in various parts of the country. Evaluation of technical reports submitted by the students at the end of trip will be carried out. The reports would be assessed and graded.

EWM 799: PGD Research Project (6 Units)

Supervised study on an identified problem requiring both oral and written presentation. Students must attend tutorial on research techniques and scientific writing as well as oral presentation relating to student's project in School. Students will be graded from the assessment of the Project Supervisor, the External Examiner's Assessment and oral presentation before the Panel of Examiners. The students are mandated to submit four bound copies of the dissertation after the External Examiner's Assessment.

M. TECH ECOTOURISM AND WILDLIFE MANAGEMENT

EWM 800: Seminar (2 Units)

Students will be expected to carry out literature review on recent developments in an area of current interests in the field of Ecotourism and Wildlife Management. The area of the review should not be directly related to the student's research project. An oral presentation of the review will be presented at an organized departmental seminar. The review must be typed, bound and submitted to the department for assessment.

EWM 801: Statistics (3 Units)

Basic parameters and non-parametric statistics, analysis of variance and its application in various experimental designs, correlation and regression analysis, analysis of co-variance.

EWM 802: Research Techniques in Ecotourism and Wildlife Management (2 Units)

Introduction to research, philosophy of research, research strategy: qualitative research methodologies which include the nature of qualitative research, selecting participants, evaluating qualitative research, interviewing in qualitative research, focus groups, observation and ethnography, case

studies, projective techniques, and documents in qualitative research. Quantitative research methodologies which include the nature of quantitative research, measurement issues, reliability and validity, sampling, survey design and administration, and conducting experiments. Data entry and coding. Methods in ecology and field research. Use of SPSS and other computer-based data analysis software, interpretations of results.

EWM 803: Habitat Management (2 Units)

Terrestrial, aquatic and managed ecosystems. Concepts of biological diversity; properties and values of biological diversity, biological diversity and ecosystem integrity; managing biodiversity. Assessing, conserving and monitoring of biological diversity. The animal environment, space edges, design of edges. Habitat requirements; distribution, home range, ecological niche. Describing habitat requirements. Evidence of historical changes in habitat and associated animal populations. Field methods in habitat determination; Analysis and comparison of activity, time and place, Associating different habitat elements with differences in amount of use. Animal's response as a measure of the suitability of animal habitat. Agricultural land management for biodiversity conservation. Integrated biodiversity conservation for sustainable development.

EWM 804: Ecotourism and Wildlife Law, Policy and Administration (2 Units)

Introduction to legal framework of ecotourism and wildlife management in Nigeria, political context of wildlife management, endangered species act, natural resources laws and policies, with focus on Federal and State policies, water law and national environmental policy. Policy and legislation on protected areas, Community rights to natural resources, Local advisory committee in protected areas management.

EWM 805: Wildlife Ecology (2 Units)

Wildlife in relation to their environment. Concept of ecosystem and natural communities. Plants and animal interaction. Food and food habits. Ecology of some selected mammals (Proboscidae-African elephant- Perrisodactyla (Rhinoceros), Artiodactyla (Hippopotamidae and Bovidae (Hippopotamus and Buffalo), Carnivora (Lion) and Primata (Gorilla,Chimpanzees and Monkeys. Predator-Prey interactions. Wildlife and Human interactions. Restoration Ecology.

EWM 806: Wildlife Extension, Communication and Community Development (2 Units)

Practice of planning from a community perspective. Techniques for community visioning, goal setting and master planning. Using regulations to guide conservation. Advocacy roles of "citizen," "reformer," and "organizer." Designing curricula and memoranda of understanding (MoUs). Conflict resolution. Designing an extension programme. Participatory rural appraisal exercises. Principles and processes of communication; types of communication. Developing

communication strategies. Principles of community development, social, cultural and gender issues. Action planning process, networking and linkage. Case studies.

EWM 807: Animal Capture Techniques (2 Units)

Principles of physical and chemical immobilization. Basic pharmacology of immobilising drugs. Types and safe usage of wildlife capture equipment. Principles of safe handling of mammalian, avian and reptile species. Anesthesiology of wildlife species. Handling and care of wildlife species under physical and chemical immobilization. Problems associated with animal capture, sample taking and data collection. Mass capture techniques. Transportation. Management of released wild animals. Occupational health, practical training in approaching dangerous animals.

EWM 809: Field Trip (2 Units)

Students will carry out field trip to areas of Wildlife and Ecotourism establishments for not less than 7 days. Report will be type written, bound and submitted to the department for grading.

EWM 810: Zoo and Museum Management (2 Units)

Zoo and museum management, biology of special groups of animals often kept in captivity like primates, big cats, canids, large birds, or reptiles. Basic concepts and techniques of animal handling, practical management skills required, policies and regulations that affect the operations of zoos. Theory and practice in museums management, educational roles of museums, collection and management policies and procedures, fundamental principles of exhibit design, production and maintenance.

EWM 811: Range Ecology and Management (2 Units)

Identification and classification of African rangelands with particular emphasis on West and East Africa. The savannas as a major biogeographic region: Savanna woodlands, Savanna parklands, Savanna grasslands, Low tree and shrub savannas, Thicket and scrubs, Land use in the savannas. Distribution of wild herbivores in the savannas. Animal-plant interactions in rangelands: Animal units and exchange ratios among different herbivores. Habitat and food selection/preference, Ecological separation and Livestock/wildlife grazing interactions. Management of some selected important Nigerian range plants and animals. Management of grazing systems and the role of fire and water spreading in range and pasture improvement. Shelter belt forestation and desertification control measures. The Nigerian major range management problems and identified preferred solutions. User rangeland resources and importance of rangeland in Nigerian economy. Producing management plans and feasibility studies for grazing reserves.

EWM 812: Conservation Genetics (2 Units)

The application of conservation genetics in biodiversity management. Study design and sampling consideration in

conservation genetics. Sampling collection and storage. Introduction to Microsatellite; genetic diversity; calculate level of genetic diversity. Hardy Weinberg as foundation for population genetics. Genetic drift and differentiation, assignment test, hybridization, wildlife forensic. Demographic estimation from microsatellite, DNA sequences. Demographic estimation from DNA sequence data. Phylogenetics.

EWM 813: Population Ecology (2 Units)

The concept of population; Population density, Types of population density, Crude density, Ecological density. Parameters affecting population density; Natality rate - nutrition, age structure, environmental factors. Mortality rate - predation, disease and parasites, weather. Immigration. Emigration. Life tables, Mortality curves, Survivorship curves. Population structure, Age composition, Age pyramids, Sex composition, Sex pyramids. Population distribution, Types of distribution. Factors influencing population dispersal. Intrinsic factors - competition, disease and pests, food supply, parasitism, predation, behavioral, Extrinsic factors - weather, topography, latitude, edaphic. Population growth model. Population fluctuations and cycles, key factor analysis.

EWM 814: Remote Sensing and GIS (2 Units)

Remote sensing, biophysical consideration, the aerial camera and film filter combination, geometrical characteristics of aerial photographs, thermal scanning, SLAR; remote sensing by satellites; application to forest resources management, application of geographical information systems in environmental management.

EWM 815: Wetlands and Avian Conservation (2 Units)

The abundance, structure, and function of wetland ecosystems in Nigeria. Wetland ecological principles and its application to conservation, restoration, and management of wetlands and wetland dependent organisms. Adaptation of biological organisms to the wetland environment. Principles of conservation and management of birds. Avian conservation and management issues across Africa. Critical area for conservation of birds in Nigeria. Important Bird Areas in Nigeria. Endangered and threatened bird species of Nigeria. Strategies for conservation of endangered bird species in Nigeria. The concepts, theories, and ideas related to the conservation and management of threatened and endangered bird populations, and their habitats. Environmental, ecological and ecotourism functions of avian. General patterns of bird migration. The importance of protection of stopover points for the conservation of migratory birds and ecotourism development.

EWM 816: Natural Resource Economics and Enterprise Development (2 Units)

Overview of basic economic principles and their application in wildlife and ecotourism industry, concepts of dynamic optimization of harvest and depletion rates, wildlife policy and multi-species modeling, economic collective decisions. Overview of biodiversity business development, key

opportunities and challenges, biodiversity business success factors, types of biodiversity business, steps to enterprise development.

EWM 817: Conservation Biogeography (2 Units)

Biogeographical principles, theories, and analyses. The distributional dynamics of taxa individually and collectively. Problems of biodiversity conservation. Social values and conservation biogeography. Biogeographical barriers such as mountains, rivers, forest formations and discontinuity in forest spread. Protected area planning frameworks - mapping present and future biogeographical regions. Major biogeographical barriers in Africa.

EWM 818: Game Ranching, Domestication and Crocodile Farming (2 Units)

Background to wildlife farming and ranching, principles and guidelines; laws and regulations governing wildlife farming and ranching in Nigeria and their enforcement; types and purposes of farms; critical issues in wildlife farming; diseases and parasites on a farms; species of interest for wildlife farming; management of a wildlife farm. Types of ranches; planning a wildlife ranch: types of animals to be ranned, ecological capacity, designing a stocking program, infrastructure and equipment; salt lick distribution, harvesting technique. Marketing of farm and ranch products; record keeping.

EWM 819: Protected Area Planning and Management (2 Units)

Categories of protected areas , steps in planning, conditions necessary for planning, types and level of planning, park planning processes, planning team, phases in park planning process(pre design, design, development and actualization), land use in protected areas, zoning buffer , core and regional influence zone.

EWM 820: Community Participation in Renewable Resource Management (2 Units)

Definition of community and participation, types of community, forms/typology and benefits of participation, ladder of Participation, what to avoid in participation, stakeholder's analysis. Who are stakeholders? Identifying stakeholders, linkages between stakeholders and different types of participation, participation tools, success factors of participatory method, gender issues in participation, Case studies on community participation from East Africa, the Pacific and South east Asia.

EWM 821: Environmental Survey and Data Indices Production (2 Units)

Concept of environmental survey (bio-physical and biochemical components). Visual survey (reconnaissance) (Purpose, location, habitat parameters, geology, meteorology), Surveying methods; Leveling and Topographic survey – Location, Accessibility, Communication, Power supply,- Land status. Topographic maps and plans. Index or location map, Boundary

map, Contour map, Cross and longitudinal section and Land map General Information and data needed for topographic survey; Hydrological data, Meteorological data, Water Source and quality, Principles of dynamics of vegetation.. Environmental factors, their interrelationships and influence on plant growth, development and animal distribution

EWM 822: Ecotoxicology and Waste Management (2 Units)

Principles of environmental toxicology, environmental pollution and control, waste management, types of waste (domestic, municipal and industrial) waste disposal, techniques for minimizing waste generation, waste treatment and processing.

EWM 823: Land Use Planning for Conservation (2 Units)

Definition of soil; Soil components; Important soil properties; Soil profiles. Soil formation and classification. Soil catena and its relationship to vegetation and land use. Land surveying; Chain and compass survey, Distance measurement (pace factor), What is land use planning? When is land use planning useful? Focus on land use planning, Planning at different levels, Land use planning steps. Land evaluation; Land evaluation systems, Land qualities and characteristics for different land uses, Land use requirements, Preparation of land capability/suitability maps, Standard format of land evaluation reports, Preparation of a land use plan, Preparation of a participatory land use plan. Land use planning in protected areas, Biodiversity values and selection of protected areas, Assessing potentials, Land use zones within protected areas, Core zones, Buffer zones, Transition zones. Land use conflicts; Definition of land use conflict, Causes of land use conflict and Resolving land use conflicts

EWM 824: Management of Endangered Species (2 Units)

Biodiversity and drivers of species decline; conservation planning and priority setting; Causes of rarity; remedial measure against rarity; translocation of rare species; Principles and methods of reintroduction. The role of zoos and captive breeding; principles of animal husbandry; conservation medicine and wildlife disease; small population biology and genetics; in-situ conservation techniques; management and leadership skills; facilitation and team skills; GIS for conservation managers; captive and field research skills and education and community conservation.

EWM 826: Environmental Impacts Assessment and Auditing (2 Units)

Basic concepts and history of environmental relationship assessment (EIA). Relationship between Environmental Impact Assessment (EIA) and Environment Impact Statement (EIS). Essentials steps in EIA. Potential problems of EIA and proffered solutions. Cost benefit analysis as a tool for environment decision-making procedure for monitoring, auditing and preparation of environmental management programme.

EWM 830: Wildlife Diseases and Parasitology (2 Units)
Diseases of wildlife with emphasis on causes and mechanisms of disease, pathobiology of disease, and epidemiology and population significance of disease. Broad categories of wildlife diseases with an emphasis on the evolutionary strategies of viruses, bacteria and parasites. Implication for management and conservation strategies. Major parasites of wildlife species, parasitic life cycles on nematodes, cestodes, trematodes, blood protozoans, and ectoparasites. Emphasis on those common parasites which cause diseases in wildlife and/or are of major zoonotic importance.

EWM 831: Advanced Wild Animal Nutrition (2 Units)
Principles of nutrition of wild animal species; Classification of nutrient sources and composition of wild animal food. Studies on dietary requirements of wild animal species in the tropic especially protein, amino acids, energy partitions, lipid, vitamins and minerals. Characteristics, availability, limitation and utilization of food and feedstuffs. Anti-nutritional factors in feedstuffs. Digestibility and metabolic processes. Assessment of growth performance and feed utilization in wild animal species.

EWM 832: Wildlife Physiology and Adaptation(2 Units)
Homeostatic control of body sugar, carbondioxide, temperature, water. Physiology of food digestion, metabolism, reproduction. Fecundity/prolificacy of animals. physiological basis for migration. Role of different organs of animals eg liver, kidney, alimentary canal, blood system, hormonal functions. Adaptation for feeding, predators, prey, self-defense and protection. Nutrient requirements, grooming, socialization. Morphological features such as sharp claws, sharp teeth, strong and sharp beak, webbed feet, wings, hooves. Morphological shapes and adaptive features of different species of animals in their habitats.

EWM 833: Feed Formulation Technology (2 Units)
Concepts of alternative feed ingredients. Classification of foods and feedstuffs, selection and biochemical assessment of wild animal feedstuffs. Use of low cost ingredients in wild animal nutrition. Feed ingredients and feed formulation for various animal species in captivity. Fundamental feed analysis and concept of feeding standards. Principles of feed formulation overview of feed establish. Safety regulations pertaining to feed formulation.

EWM 834: Minilivestock Production (2 Units)
Techniques of feeding animals in captive setting. Hazards of animal domestication. Importance of feed supplementation and use of artificial diets in dry seasons. Nutrient requirements of the following grasscutter, giant rat, guinea fowl and snail. Studies on the nutrient composition of animal natural foods. Basic techniques in animal feed formulation for minilivestock. Techniques for both large and small rearing of minilivestock Encouragement of backyard farming in both rural and urban areas. Post-harvest techniques of minilivestock products, processing and marketing.

EWM 835: Wild Animal Resources and Utilization (2 Units)

Systems perspective of wild animals' resources and their management problems, basic and values of wildlife in national economy. Studies of basic and practical values of wild. Handling, processing, preservation and marketing of wildlife and it's by-products. Social acceptability of wildlife products. Usefulness of wild animal and its by-products in various industries.

EWM 836: Apiculture (2 Units)

Locating appropriate site for honey farming, Identifying suitable conditions, for honey farming, Beehive construction, types of wood required and the size of the hives, detection of appropriate time to harvest materials needed for the operation , harvesting techniques, uses of honey products, assessment of honey quality , processing honey for different uses.

EWM 840: Recreation Ecology (2 Units)

What is park/recreation ecology, significance and implication, types of impact, factor/degree of impact: resistance and resilience, pattern of impact: spatial and temporal impact patterns, impact management, multidisciplinary nature of park recreation ecology (holistic approach), impact monitoring: social and biological monitoring methods, impact management: visitor and site management strategies, invasive species management, research trends and future research in park recreation ecology.

EWM 841: Ecotourism and Recreational Planning (2 Units)

Review of current tourist industry operations and practices, organization, management and structure of the tourism industry. Introduction to ecotourism, niche for ecotourism today. Ecotourism planning, marketing and management. Ecotourism and community development. Ecotourism's implications for sustainable development and environmental conservation. Management issues pertaining to the establishment and operations of a travel agency, travel agency licensing, IATA accreditation and financial management issues.

EWM 842: Cultural Heritage Conservation (2 Units)

The roles of culture in nature conservation, Indigenous knowledge, traditional practice, norms and belief on conservation, stories, taboos, riddles, slogans, tales poetry, commentaries, proverbs, sayings, and songs to teach conservation, integrating indigenous conservation methods in conservation, local conservation areas, sacred groves, shrines, restricted areas, Environmental education and cultural awareness, methods of disseminating conservation education, education for sustainability, formation of environmental conservation clubs, eco clubs, green clubs, local community groups, cultural heritage tourism, intangible and tangible heritage resources, cultural heritage tourism, creative industries and local enterprise , archeological , historic and monuments sites management.

**EWM 843: Park and Environmental Interpretation
(2 Units)**

Principles of park interpretation: aims; purpose; benefits; differences between interpretation information and instruction; reasons for interpretation; benefits of interpretation; principles of interpretation; types of audience; setting, Interpretive media, planning interpretation to meet the needs of different visitor types; consideration of relevance to setting; selection of appropriate media; consideration of accessibility; planning guided and self-guided interpretive activities; script/talk/story board planning; planning walks/trails, planning interpretive media (content, location and layout); planning themes and making interpretation interesting, relevant, enjoyable and organised; management requirements use of themed interpretation; design considerations for printed interpretation, planning talks and tours.

EWM 844: Ecolodge Management and Sustainable Tourism Development (3 Units)

Ecolodge principle and criteria, types of ecolodge, management of ecolodge, community involvement in ecolodge management, impacts of ecolodge, Designs and operations of ecolodge, visitors management. Nature and scope of sustainable tourism, Carrying capacity, Community participation in ecotourism development, types of sustainable tourism, social and economic impacts of sustainable tourism, various approaches to sustainable tourism management. Local stakeholder involvement in community based ecotourism, stakeholder analysis. Principles of community-based ecotourism, monitoring the success and impacts of community-based ecotourism, case studies of successful community-based ecotourism projects, challenges and opportunities for local participation.

EWM 845: Advanced Ecotourism Marketing and Publicity (2 Units)

What is tourism/ecotourism marketing, Importance of marketing, the marketing process, designing customer driven

marketing strategy, social marketing concept. Marketing management philosophies, marketing plans, characteristic of service marketing, management strategies for service business, role of marketing in strategic planning, the marketing information system, Marketing research, market segmentation, Targeting and positioning, designing and managing products. Policy as marketing tools- considerations approaches and strategies, distribution channels, promoting products communication, promotion policy and advertising, public relations, marketing public relations, public relation process, sales promotion.

EWM 899: Master's Thesis Research Project (12 Units)

Student will carry out a research project under the supervision of one or more members of academic staff. The research, of which outcome should contribute to knowledge, could be investigative, basic or applied and would in most cases, be directed at solving an identified problem related to wildlife or Environmental Ecology. The student will be expected to make an oral presentation in departmental seminars of the project plan and/or its progress before or during the investigation and of the outcome at the completion of the research. The provision of a project supervisor notwithstanding, the student should be made to demonstrate independent initiative and motivation, as this will be considered in the project assessment. A final report of the project will be typed and bound in an approved format and the student will be expected to satisfy a panel of internal and external examiners at an oral examination.

EWM 999: Doctoral Research Project

Independent research on topics within the area of Wildlife Ecology, Production, Ecotourism and Biodiversity Conservation chosen in consultation with the student's supervisor. A thesis will be submitted on completion in partial fulfillment of the requirement for the award of Doctor of Philosophy (Ph.D.) degree.

LIST OF ACADEMIC STAFF

S/N	NAME	QUALIFICATION	STATUS	AREA OF SPECIALIZATION
1	Prof. Ogunjemite, B. G.	B.Sc. Botany (Port Harcourt).M. Tech. Wildlife Mgt, Ph.D. Wildlife (Akure)	Professor (HOD)	Primate and Community Ecology
2.	Prof. Agbelusi, E. A.	B.Sc. Wildlife Mgt, M.Sc. Wildlife Mgt. (Ibadan) Ph.D. Wildlife (Akure)	Professor	Wildlife Ecology and Conservation
3.	Prof. Adeyemo, I. A.	B.Sc. Animal Production, M.Sc. Animal Production, Ph.D. Wildlife (Ibadan)	Professor	Wildlife Nutrition
4	Dr. (Mrs) Ejidike, B. N.	B. Tech. Fisheries & Wildlife, (Akure) M.Sc. Fisheries (Ibadan), Ph.D. Wildlife (Akure).	Senior Lecturer	Wildlife Nutrition
5.	Dr. Ogunjinmi, A. A.	B. Forestry and Wildlife Mgt., M. Environmental Mgt. & Protection, PhD. Wildlife (Abeokuta).	Senior Lecturer	Wildlife Extension/Conservation Education and Ecotourism
6.	Dr. (Mrs) Oyeleke, O.O.	B. Fisheries and Wildlife Mgt. (Abeokuta), M.Sc. Wildlife (Ibadan), PhD Wildlife (Akure).	Senior Lecturer	Protected Areas Management and Ecotourism
7.	Mr. Owolabi, O. O.	B.Sc. Wildlife, M.Sc. Wildlife (Ibadan)	Lecturer I	Wildlife Conservation
8.	Dr. (Mrs) Adetola, B.O.	B. Tech. Fisheries & Wildlife (Akure), M.Sc. Ecotourism Mgt., PhD Ecotourism (Ibadan)	Lecturer I	Ecotourism and Biodiversity Management
9.	Dr. Oladeji, S. O.	B.Tech. Forestry (Akure), M.Sc. Envi Mgt. (Akungba), PhD Ecotourism (Akure)	Lecturer I	Heritage Conservation and Ecotourism Management
10.	Dr. Odewumi O. S.	B.Tech. Fisheries & Wildlife, (Akure), M.Tech. Wildlife (Akure), PhD Wildlife (Akure).	Lecturer I	Management of Wetlands and Aquatic Wildlife
11	Dr. (Mrs.) Arowosafe, C.F.	B. Agric. Tech., M. Tech. Agric. (Akure).	Lecturer II	Ecotourism and Hospitality Management

9.1.6 DEPARTMENT OF FISHERIES AND AQUACULTURE TECHNOLOGY (FAT)

1. PROGRAMMES OFFERED

- a) Postgraduate Diploma (PGD)
- b) Masters of Agricultural Tech. (M. Agric. Tech.)
- c) Doctor of Philosophy (Ph.D.)

2. AVAILABLE OPTIONS/ SPECIALIZATION

- a) PGD with specialization in
 - i) Fisheries Management
- b) M. Agric. Tech. with specialization in
 - i) Fisheries Management
 - ii) Aquaculture
- c) Ph.D. with specialization in
 - i) Fisheries Management
 - ii) Aquaculture
 - iii) Fish Nutrition
 - iv) Post Harvest Technology and Utilization

3. PHILOSOPHY AND OBJECTIVES

a) Philosophy of the Programme

The philosophy of the programme is to provide functional education for Postgraduate students who eventually after the training will become job makers and job creators who in addition will be trainers of top level academics and Masters of Industrial sector.

The Academic programme is well focused and tailored towards advancement of knowledge in Environmental Control and Management, Biodiversity Management, Fish Production, Utilization and Advanced aquacultures for food production and poverty alleviation.

b) Programme Objective

The major objectives of the programme are to:

- i) provide advanced education and training in the science and technology of fisheries, resources, aquaculture, environmental impact assessment, biodiversity management to cater for the Higher Management Requirements of the nation.
- ii) provide functional education for Postgraduate students at Masters and Postgraduate diploma levels who will eventually become job makers and trainers of the captains of Industries and distinguished academics.
- iii) provide opportunity for problem solving research studies focused on fish production and utilization and provision of the necessary raw materials for the national agricultural Industries in this sub sector.
- iv) offer to the public the results of research break-through and foster the practical application of these results.
- v) provide advanced studies and higher training in environmental impact assessment, environmental control and management, management of national biodiversity, and industrial bionutrients production, for sustainable agriculture and poverty alleviation especially in rural areas.

4. ADMISSION REQUIREMENTS

Candidates seeking admission for doctor of Philosophy (Ph.D.) must have obtained 60% or 3.50 CGPA weighted averaged mark in the Master's degree programme in any recognized university and show satisfactory potential for research work.

To qualify for admission into a Masters Programme, candidate shall normally possess a good Bachelor's degree from this University or any other University recognized by the senate of FUTA; at second-class upper or lower division, candidates with good honour degrees in fisheries, wildlife or fisheries and wildlife combined or botany zoology. Biology or other related subjects are eligible; where necessary the Department will prescribe additional required courses for any candidate having deficiencies.

Candidates for Postgraduate diploma courses shall normally posses B. Sc. Degree Honours not less than a third class in relevant biological or agricultural courses, HND holders with upper or lower credit are also eligible.

5. DURATION OF THE PROGRAMME

a) PGD

The academic programme, which will be on a part-time basis, includes a course work and a supervised research project and both will cover a minimum period of three (3) semesters.

b) M. Agric. Tech.

Full-time: 18 months

c) Ph.D.

Full –time: 36 months

Part-time : 48 months

(On application, candidates may be granted extension on programme duration subject to approval of senate).

6. REQUIREMENT FOR GRADUATION

a) PGD

To be eligible for the award of PGD, a candidate must have passed 36 units of course work, including 6 units of research Project.

b) M. Agric. Tech.

M. Agric. Tech. in the area of specialization is awarded to a candidate who has:

- i) accumulated a TLU of 36 including 12 units of Thesis Research, 18 units of 6 compulsory or core courses and 6 units of Electives;
- ii) successfully presented a minimum of two (2) Departmental Research project Seminars;
- iii) Successfully defended the Research Thesis in the specialized area at an oral examination organized by the School of Postgraduate Studies (SPGS).

c) Ph.D.

A candidate is awarded a Ph.D. degree after he has successfully

- i) completed any prescribed course work;
- ii) presented three (3) Departmental Research project Seminars;
- iii) defended the Research Thesis in a specialized area at an oral examination organized by the School of Postgraduate Studies (SPGS).

7. COURSE OUTLINE

(a) PGD

FIRST SEMESTER

Course Code	Course Title	T	L	P	Units
FAT 751	Aquaculture Production and Management	0	3	0	3
FAT 753	Water Quality and Aquatic Production	3	0	0	3
FAT 755	Research Methods and Statistics	3	0	0	3
FAT 757	Shrimp/Prawn Culture	3	0	0	3
FAT 759	Fish Parasitology and Pathology	3	0	0	3
	TOTAL	12	3	0	15

SECOND SEMESTER

Course Code	Course Title	T	L	P	Units
FAT 750	Seminar	0	2	0	2
FAT 752	Fisheries Extension & Education	0	2	0	2
FAT 754	Fish Breeding and Biotechnology	0	3	0	3
FAT 756	Fish Nutrition and feed Technology	0	3	0	3
FAT 758	Post Harvest Technology	0	3	0	3
FAT 760	Fish Marketing and Cooperatives	0	3	0	3
	TOTAL	0	16	0	16

THIRD SEMESTER

Course Code	Course Title	T	L	P	Units
FWL 799	PGD Research Project	0	0	0	6
	TOTAL	0	0	0	6

b) M.TECH

(i) Aquaculture Option

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
FAT 801	Statistics and Experiment designs	3	0	0	3
FAT 803	Advanced Fish Breeding Technology	2	0	3	2
FAT 805	Advanced Fish Biology	2	0	0	2
FAT 807	Water Quality assessment	2	0	0	2
FAT 809	Aquaculture Planning & Feasibility Studies	2	0	0	2
FAT 811	Advanced Shell Fish Biology and Production	2	0	0	2
	Electives				4
	TOTAL	13	0	3	17

Electives

Course Code	Course Title	L	T	P	Units
FAT 825	Fisheries Extension and Education	2	0	0	2
FAT 827	Advanced Cage Culture Systems	2	0	0	2

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
FAT 800	Seminar	2	0	0	2
FAT 802	Advanced Fish Nutrition	2	0	0	2
FAT 804	Fish Pathology and Parasites	2	0	0	2
FAT 806	Advanced Fish Post Harvest Technology	2	0	0	2
FAT 808	Water Chemistry and Pollution	2	0	0	2
FAT 810	Fish Marketing and Cooperatives	2	0	0	2
	TOTAL	12	0	0	12

Electives

Course Code	Course Title	L	T	P	Units
FAT 816	Production & Marketing of Other Marine Products	2	1	0	3
FAT 818	Advanced Larval Food Production	2	0	3	2

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
FAT 899	Master's Thesis Research Project	0	0	0	12

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
FAT 899	Master's Thesis Research Project	0	0	0	12

(ii) Fisheries Management Option

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
FAT 801	Statistics and Experimental Designs	3	0	0	3
FAT 805	Advanced Fish Biology	2	0	0	2
FAT 813	Environmental Impact Assessment and Pollution	2	0	0	2
FAT 815	Fisheries Development and Management	2	0	0	2
FAT 817	Oceanography and Water Quality Assessment	2	0	0	2
FAT 821	Marine Resources and Utilization	2	0	0	2
	Electives				4
	TOTAL	13	0	0	17

Electives

Course Code	Course Title	L	T	P	Units
FAT 811	Advanced Shellfish Biology & Production	2	0	0	2
FAT 823	Ecosystem Modeling	2	0	0	2
FAT 825	Fisheries Extension and Education	2	0	0	2
	TOTAL	6	0	0	6

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
FAT 800	Seminar	0	2	0	2
FAT 804	Fish Pathology and Parasites	2	0	0	2
FAT 806	Advanced Fish Post Harvest Technology	2	0	0	2
FAT 810	Fish Marketing and Cooperatives	2	0	0	2
FAT 812	Fisheries Policy and Administration	2	0	0	2
FAT 814	Fish Stock Assessment & Pollution Dynamics	2	0	0	2
FAT 820	Ornamental & Recreational Fisheries	2	0	3	2
	TOTAL	12	2	0	14

(c) PhD

Course Code	Course Title
FAT 999	Doctoral Research Project

9. COURSE SYNOPSSES

(POSTGRADUATE DIPLOMA IN FISHERIES MANAGEMENT AND AQUACULTURE)

FAT 750: Seminar (2-Units)

Students will be expected to carry out literature review on recent developments in an area of current interests in the field of Aquaculture. The area of the review should not be directly related to the student's research project. An oral presentation of the review will be presented at an organized departmental seminar. The review must be typed, bound and submitted to the department for assessment.

FAT 751: Aquaculture Production and Management (3-Units)

Aims and types of aquaculture, principles of fish stocking, lining, pond fertilization, feeding, weed control, fish harvesting, water quality requirements, species selection and artificial propagation, pond maintenance.

FAT 752: Fisheries Extension and Education (2-Units)

Principles and methods of extension programmes, extension need in aquaculture and fisheries management, interpretation and dissemination of research findings, organizing associations and cooperatives, methods of evaluation and methods of information dissemination.

FAT 753: Water Quality and Aquatic Production (3-Units)

Physical and chemical composition of water bodies, nutrient cycles and aquatic productivity, sampling methods and analyses, pollution and impacts on water bodies and aquatic organisms, Methods of water quality assessment and improvement.

FAT 754: Fish Breeding and Biotechnology (3 – Units)

Principles of fish breeding, selection of brooders, induced spawning, types of artificial propagation and methods, incubation and hatching of fish eggs, rearing of hatchlings, fry and fingerlings, use and types of natural food, maintenance and management of techniques of indoor and outdoor hatcheries, sales and economics of fish seed production.

FAT 755: Research Methods and Statistics (3-Units)
Research techniques, data collection and representation, frequency distribution, line diagram, bar diagram, histogram and relative frequency, histogram, pie charts and cumulative frequency distribution, measures of central tendency, sampling techniques, bionomial and normal distribution, correlation and regression, analysis of variance and applications.

FAT 756: Fish Nutrition and Feed Technology (3-Units)

Rudiments and principles of fish nutrition, classification of foods and feed-stuffs, biochemical assessment of fish feed-stuffs and selection, use of low-cost ingredients in fish nutrition.

FAT 757: Shrimp / Prawn Culture (3-Units)

Identification and classification of marine and freshwater shell fishes, Culture of tropical prawn and shrimp, Production of bivalves and pearl oyster, Water quality and toxicity, Nutrition, disease and genetics of freshwater crustacean.

FAT 758: Post Harvest Technology (3-Units)

The structure and principal components of fish muscles, and factors affecting their composition, major causes of fish spoilage, physical and chemical changes after rigor mortis, fish preservation and processing, fish quality assessment, organoleptic measurement and international standards for fisheries products.

FAT 759: Fish Parasitology and Pathology (3-Units)

Identification, morphology, taxonomy, life history of prevalent parasites and their effects on fish population common bacterial, fungal and final fish diseases and their control. Preservation of feedstuffs and factors affecting feedstuffs quality, nutrient requirements for fish, (herbivorous and carnivorous spp).

FAT 760: Fish Marketing and Cooperatives (3-Units)

Principles and importance of marketing, market structures and functions, marketing agencies, channels of distribution, promotional activities, factors affecting marketing of fisheries products, origin and principles of cooperative, types and functions of cooperative societies, methods of disbursement of dividends, factors affecting the growth of cooperative societies.

FAT 799: PGD Research Project (6-Units)

Supervised study on identified problems requiring both oral and written presentation. Students must attend tutorials on research techniques and scientific writings as well as oral presentation relating to students' projects in the schools. The projects must be based on use of locally available raw materials to solve problems facing wildlife production in Nigeria.

M. TECH. IN AQUACULTURE

FAT 800: Seminar (2-Units)

Students will be expected to carry out literature review on recent developments in an area of current interests in the

field of Aquaculture. The area of the review should not be directly related to the student's research project. An oral presentation of the review will be presented at an organized departmental seminar. The review must be typed, bound and submitted to the department for assessment.

FAT 801: Statistics and Experimental Design (3-Units)

Basic parameters and non-parametric statistics; analysis of variance and its application in various experimental designs, correlation and regression analysis, analysis of co-variance.

FAT 802: Advanced Fish Nutrition (2-Units)

Studies on dietary requirements of fish species (Tropical and Temperate fish species) especially; proteins, amino acids, energy partitions, lipid vitamins and minerals. Feedstuffs and ingredients, their sources, characteristics, availability, limitation and utilization in fish feed. Anti-nutritional factors in feedstuffs and ingredients. Various methods of processing fish feed and feed formulation techniques. Assessment of growth performance and feed utilization in fish.

FAT 803: Advanced Fish Breeding Technology(2-Units)

Fish seeds in aquaculture. Selecting fish species for fish breeding. Hatchery system design, infrastructure and organization. Broodstock management. Hormonal treatment of fish. Egg incubation and hatching. Technology of larval and early fry rearing, as well as production of live foods. Common problems in fish seed production and their management. Transport of fish seeds and broodstock. Cryopreservation and genetic manipulation in fishes.

FAT 804: Fish Pathology and Parasites (2-Units)

Types of diseases, infectious and contagious disease, factors, vomits, viruses, bacteria, fungi, protozoa recognition of diseases, species specific diseases, effects of disease, control of diseases, general health principles, external and internal structures of fish, their function and importance, immunity and defense in fish.

FAT 805: Advanced Fish Biology (2-Units)

Morphology and anatomy of typical bony and cartilaginous fishes, fish physiology and reproduction, embryology and fecundity studies, age and growth functions, condition factors, length-weight relationships and frequency of distribution, digestive enzyme studies, assay methods.

FAT 806: Advanced Fish Post Harvest Technology (2-Units)

Review of structure of fish muscle. Biochemical composition of fish muscle and factors affecting them. Causes of fish spoilage. Post mortem changes in fish. Processing and preservation techniques of fish. Physical, chemical, laboratory, microbiological and sensory evaluation techniques of assessing fish spoilage and storage length. Quality control, guidelines and standardization of fish products.

FAT 807: Water Quality Assessment (2-Units)

Ocean current, characteristics, similarities with atmospheric circulation, upwelling and fish production global warming, ocean water stratification, seasonal thermocline, ocean convection, vertical currents, pollution, temperature and salinity measurement, relevance of oceanographic forecasting to the fishermen and fisheries management.

FAT 808: Water Chemistry and Pollution (2-Units)

Water chemistry and pollution studies, distribution, movement and production of plankton, physical properties of water.

FAT 809 : Aquaculture Planning And Feasibility Studies (2-Units)

Land survey, clearing and excavation, soil tests, water tests, farm site/location, effluent management Economics of production and feasibility studies.

FAT 810: Fish Marketing and Cooperatives (2-Units)

Marketing – General theories of market and classification. Supply factors affecting fish supply, price determination. Marketing function and services. Cooperative – formation, goals and functions of fishermen cooperative, factors influencing size, role of cooperative in fisheries economy and government's role.

FAT 821 : Marine Resources and Utilizations (2 - Units)

Current status of Marine resource biodiversity. Marine Ecosystem diversity and characterization, Ecological niches, habitat profile. Exploitation strategies. Deep sea and shore farming of some products. Utilization and marketing of marine products.

FAT 825: Fisheries Extension and Education

Principles and methods of programme planning, extension in fisheries, use of mass methods, group methods, demonstration and individual methods and their merits and demerits, organization of associations. Concept of evaluation applied to fisheries extension and dissemination of research findings to feed workers.

FAT 816: Production and Marketing of Other Marine Products (3-Units)

Ecology-life histories and distribution of other marine products – Mollusk, marine gastropods, edible sea weeds, reptiles, and other invertebrates. Production, harvesting techniques, utilization and marketing. Contribution to the national economy and channels of distribution.

FAT 818: Advance Larval Food Production (2-Units)

larval cultivation of fin fish and shellfish and the necessity to produce live food production methods and environmental conditions for cultivating marine and freshwater finfish and shellfish larval. Principles and practices of larval food production; plankton aquaculture - *Chlorophycota, Bacillariophyta, Cyanophycota, Rhodophyta Chrysophyta*. Rotifer, copepods and micro algae culture parameters,

production level reliability. Cost reduction and ongoing development on commercial-scale production of live feeds for larvae of finfish and shellfish. Preparation, culture and feeding of micro algae, rotifers and brine shrimp artemia.

FAT 827: Advanced Cage Culture System (2-Units)

Marine aquaculture, cage culture systems, selection of species for cage culture, types of cage, construction, effects of construction materials on the water environment, effects of cage culture in practices in the water environment and aquatic biodiversity.

FAT 899: Master's Thesis Research Project (12 Units)

Students will carry out a research project under the supervision of one or more members of academic staff. The research of which outcome should contribute to knowledge, could be investigative, basic or applied and would in most cases, be directed at solving an identified problem related to fisheries or Environmental Ecology. The student will be expected to make an oral presentation in departmental seminars of the project plan and/or its progress before or during the investigation and of the outcome at the completion of the research. The provision of a project supervisor notwithstanding, the student should be made to demonstrate independent initiative and motivation, as this will be considered in the project assessment. A final report of the project will be typed and bound in an approved format and the student will be expected to satisfy a panel of internal and external examiners at an oral examination.

M. TECH. IN FISHERIES MANAGEMENT**FAT 800: SEMINAR (2-UNITS)**

Students will be expected to carry out literature review on recent developments in an area of current interests in the field of Aquaculture. The area of the review should not be directly related to the student's research project. An oral presentation of the review will be presented at an organized departmental seminar. The review must be typed, bound and submitted to the department for assessment.

FAT 801: Statistics and Experimental Designs(3-Units)

Basic parameters and non-parametric statistics, analysis of variance and its application in various experimental designs, correlation and regression analysis, analysis of co-variance.

FAT 804: Fish Pathology and Parasites (2-Units)

Types of diseases, infectious and contagious disease, vectors, vomits, viruses, bacteria, fungi, protozoa recognition of diseases, species specific diseases, effects of disease, control of diseases, general health principles, external and internal structures of fish, their function and importance, immunity and defense in fish.

FAT 805: Advanced Fish Biology (2-Units)

Morphology and anatomy of typical bony and cartilaginous fishes, fish physiology and reproduction, embryology and fecundity studies, age and growth functions, condition factors,

length-weight relationships and frequency of distribution, digestive enzyme studies, assay methods.

FAT 806: Advanced Fish Post Harvest Technology (2-Units)

Review of structure of fish muscle. Biochemical composition of fish muscle and factors affecting them. Causes of fish spoilage. Post mortem changes in fish. Processing and preservation techniques of fish. Physical, chemical, laboratory, microbiological and sensory evaluation techniques of assessing fish spoilage and storage length. Quality control. Guidelines and standardization of fish products.

FAT 807: Water Quality Assessment (2-Units)

Ocean currents, characteristics, similarities with atmospheric circulation, upwelling and fish production global warming, ocean water stratification, seasonal thermocline, ocean convection, vertical currents, pollution, temperature and salinity measurement, relevance of oceanographic forecasting to the fishermen and fisheries management.

FAT 810: Fish Marketing and Cooperatives (2-Units)

Marketing – General theories of market and classification. Supply factors affecting fish supply, price determination. Marketing function and services. Cooperative – formation, goals and functions of fishermen cooperative, factors influencing size, role of cooperatives in fisheries economy and government's role.

FAT 811: Advanced Shell Fish Biology and Production (2-Units)

Life histories and distribution of crustaceans Aquaculture techniques and culture of penaeid shrimps, freshwater Macrobrachium, marine and freshwater crabs. Production scales and farming systems level. Marketing, processing and utilization of portunid crabs, lobsters and crayfish. Crustacean health, pests and diseases. Channels of distribution.

FAT 812: Fisheries Policy and Administration (2-Units)

National laws on natural resources management, fisheries legislation, national and state policies on fisheries, administrative structures of fisheries in Nigeria, fisheries conservation efforts and problems in Nigeria, fisheries institutions, conservation strategies, international laws and laws of the sea.

FAT 813: Environmental Impact Assessment and Pollution (2-Units)

Water quality monitoring and control, setting of water quality standards , water sampled analysis, detection of causes of water degradation and fish mortality, diagnosis of cause of fish poisoning, hydrobiological examinations.

FAT 814: Fish Stock Assessment and Population Dynamics (2-Units)

The primary objectives of fish stock assessment, the stock concept, analytical, holistic models in fish stock assessment.

Evaluation of fisheries resources in related aquatic environment fish population analysis. Attributes of population dynamics, such as growth, mortality, recruitment, age, sex, etc. different sampling techniques in fisheries.

FAT 815: Fisheries Development and Management (2-Units)

Basic and practical objectives of fisheries development and management; development and management of lakes, rivers, impacts of wetlands and mangrove ecosystems on fisheries production. The concept of maximum sustainable yield and production functions. Coral reefs ecology and influence on fish production.

FAT 818 : Advance Larval Food Production (2-Units)

Introduction to larval cultivation of fin fish and shellfish and the necessity to produce live food production methods and environmental conditions for cultivating marine and freshwater finfish and shellfish larval. Principles and practices of larval food production; plankton aquaculture – Chlorophycota, Bacillariophyta, Cyanophycota, Rhodophyta Chrysophyta. Rotifer, copepods and micro algae culture parameters, production level reliability. Cost reduction and ongoing development on commercial-scale production of live feeds for larvae of finfish and shellfish. Preparation, culture and feeding of micro algae, rotifers and brine shrimp artemia.

FAT 820: Ornamental and Recreational Fisheries (2 Units)

Identification, management and nutrition of ornamental fishes; design, construction and maintenance of fountains, aquaria and ponds for ornamental fishes. Culture and breeding of aquarium fishes. Aquarium fish trade, sport fishing in recreation and tourism. Management techniques and daily routine operations in the culture of ornamental and recreation fisheries. Economic importance of ornamental and sport fishes, especially tropical fish species.

FAT 821: Marine Resources And Utilization (2-Units)

Current status of Marine resource biodiversity. Marine Ecosystem diversity and characterization, Ecological niches, habitat profile. Exploitation strategies. Deep sea and shore farming of some products. Utilization and marketing of marine products.

FAT 823: Ecosystem Modelling (2-Units)

Modeling water quality in marine ecosystems, characteristics of marine aquaculture systems, phytoplankton and heterotrophic processes, sediment water interactions, hydrodynamics, dissolved oxygen models, temperature models, food webs, phytoplankton and dissolved oxygen.

FAT 825 : Fisheries Extension and Education (2-Units)

Principles and methods of programme planning extension in fisheries use of mass method, group method, demonstration and individual methods and their merits and demerits. Organization of associations such as angling/handling clubs and cooperatives. Concepts of evaluation applied to fisheries

extension and dissemination of research findings to field workers.

FAT 899: Master's Thesis Research Project (12-Units)

Students will carry out a research project under the supervision of one or more members of academic staff. The research, of which outcome should contribute to knowledge, could be investigative, basics or applied and would in most cases, be directed at solving an identified problem relation to wildlife or Environmental Ecology. The student will be

expected to make an oral presentation in departmental seminars of the project plan and/or its progress before or during the investigation and of the outcome at the completion of the research. The provision of a project supervisor notwithstanding, the student should be made to demonstrate independent initiative and motivation, as this will be considered in the project assessment. A final report of the project will be typed and bound in an approved format and the student will be expected to satisfy a panel of internal and external examiners at an oral examination.

LIST OF ACADEMIC STAFF

S/N	NAME	QUALIFICATION	STATUS	AREA OF SPECIALIZATION
1	Adebayo, O.T.	B. Tech. (Akure), M.Sc. (Ibadan) Ph.D. (Akure)	HOD/Professor	Fish Breeding / Aquaculture Technology
2	Balogun, A.M.	B.Sc. M.Sc Ph.D. (Ibadan)	Professor	Fish Nutrition & Biochemistry
3	Fagbenro, O.A.	B.Sc., M.Sc. (Ibadan), Ph.D. (Stirling)	Professor	Fish Biology & Aquaculture
4	Fasakin, E.A	B.Sc., M.Sc. (Ibadan) Ph.D. (Akure)	Professor	Fish Nutrition/Post Harvest Techniques
5	Bello-Olusoji, O.A	B.Sc. (Lagos), M.Sc. (Ibadan), Ph.D. (Akure)	Professor	Fish Biology/Shell Fish Ecology
6	Adeparusi, E.O.	B. Tech., M. Tech., Ph.D (Akure)	Professor	Fish Nutrition & Processing
7	Nwanna, L.C.	B. Tech. (Akure), M.Sc. (Ibadan), Ph.D. (Akure)	Professor	Limnology
8	Dada, A.A.	B. Sc., M.Sc. (Ibadan), Ph.D. (Akure)	Reader	Fish Breeding/Management
9	Olufayo, M.O	B. Sc. (Nsukka), M. Tech., Ph.D. (Akure)	Reader	Water Chemistry/Toxicology
10	Olawusi-peters, O.O	B. Fisheries (Abeokuta), M.Sc, Ph.D. (Ibadan)	Senior Lecturer	Marine and Environmental Biology
11	Popoola, O.M	B. Tech. (Akure), M.Tech. (Akure), Ph.D. (Akure)	Lecturer I	Fish Genetics and Biotechnology
12	Adeleke, M.I.	B. Tech. (Akure), M.Tech. (Akure), Ph.D. (Akure)	Lecturer II	Fisheries Economics/ Management

9.1.7 DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY (FST)

1. INTRODUCTION

(a) The Department of Food Science and Technology which is one of the leading Department in the application of Science and Technology for processing and preservation of Food was established as a full Food Science and Technology and Doctor of Philosophy (Ph. D) Food Science and Technology. The PGD covers 3 semesters which involves taught courses and research project. The M. Tech programme is 4 semester (24 months) 2 semesters of taught courses and 2 semesters of research project. The Doctor of Philosophy (Ph. D) is minimum of 48months of research project.

(b) Justification for Review

The proposed review is aimed at strengthening and broadening the M. Tech programme by introducing two new courses Food Fermentation Technology and Methodology in Nutritional Evaluation Studies. The courses will make the graduates of the Department more relevant to industries in Food Science and Technology and provide the bridge requires in food product development and safety.

2. PROGRAMMES OFFERED

- (a) Postgraduate Diploma (PGD)
- (b) Master of Technology (M. Tech.)
- (c) Doctor of Philosophy (Ph. D)

3. AVAILABLE OPTIONS/SPECIALIZATION

- (a) PGD with specializations in Food Science and Technology
- (b) M. Tech with specializations in Food Science and Technology
- (c) Ph. D with specializations in Food Science and Technology

Areas of Specialization:

- (i) Human Nutrition and Metabolism
- (ii) Food Chemistry and Analysis
- (iii) Post Harvest Technology
- (iv) Quality Assurance/ Control
- (v) Food Marketing Entrepreneurship

4. PHILOSOPHY AND OBJECTIVES

The objectives of postgraduate programmes in the department is to train professional Food Scientist and Technologist who will serve in both private and public sectors of the economy.

The philosophy of the programme is to provide functional education for post-graduate students who eventually after the training will become job makers and job creators, who in addition will be trainers of top level academic and masters of industrial sector.

5. ADMISSION REQUIREMENTS

- (a) Postgraduate Diploma (PGD)

(i) Candidates with a Higher National Diploma (HND) in Food Science and Technology or allied discipline with not less than Lower Credit level.

(ii) Candidates with a 3rd Class and above in any area of Food Science and Technology or related disciplines from recognized Universities.

(b) Master of Technology in Food Science and Technology (M. Tech)

- (i) Candidates must possess 5 Credits at WASCE or SSCE or GCE or NECO at maximum of two sittings with credit in English Language, Mathematics, Chemistry, Biology or Agricultural Science and Physics.
- (ii) Candidates with PGD (Upper Credit or Distinction) in Food Science and Technology
- (iii) Candidates with first degree in Food Science and Technology or Chemical Engineering, Chemistry, Biochemistry and Agricultural Engineering and related disciplines with a minimum of Second Class Lower Division
- (iv) Candidates whose area of specialization is not Food Science and Technology are required to audit some Postgraduate Diploma Courses of the Department.

(c) Doctor of Philosophy (Ph. D)

Candidates applying for Ph. D must have the requirement listed in b(i) and b(ii) and possess a Master's degree in Food Science and Technology, or Chemical Engineering, Agricultural Engineering, Chemistry or Biochemistry with a Ph. D grade (60% or CGPA ≥ 3.50)

7. COURSE OUTLINE

(a) PGD

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
FST 701	Food Chemistry	2	0	3	3
FST 703	Principles of Human Nutrition	2	0	0	2
FST 705	Food Process Engineering	2	0	3	3
FST 707	Food Analysis	1	0	3	2
FST 709	Food Microbiology	2	0	3	3
FST 711	Fundamentals of Food Quality Control	2	0	3	3
FST 713	Fundamentals of Food Quality Control	2	0	0	2
	Electives				2
	TOTAL	13	0	15	20

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
FST 700	Course Seminar	0	2	0	2
FST 702	Fermented Foods	1	0	3	2
FST 704	Food Engineering Operations	2	0	0	2
FST 706	Food Laws and Legislations	2	0	0	2
FST 708	Sensory Evaluation of Foods	1	0	3	2
	Electives	2	0	0	2
	TOTAL	8	2	6	12

Electives

Course Code	Course Title	L	T	P	Units
FST 813	Food Irradiation Technology	2	0	0	2
FST 815	Food Business Management and Planning	2	0	0	2

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
FST 799	PGD Research Project	0	0	0	6
	TOTAL	0	0	0	6

Electives

Course Code	Course Title	L	T	P	Units
FST 710	Computer Programming / Application	2	0	0	2
FST 712	Food Marketing	2	0	3	3
FST 714	Food Product Development	2	0	0	2

(b) M.TECH FIRST SEMESTER

Course Code	Course Title	L	T	P	U
FST 801	Statistics & Research Techniques	2	0	0	2
FST 803	Food Chemistry	2	0	3	3
FST 805	Advanced Food Technology	1	0	3	2
FST 807	Advanced Food Quality Control and Plant Sanitation	1	0	3	2
FST 809	Post-Harvest Technology of Fruits and Vegetable	2	0	0	2
FST 811	Nutritional Evaluation Methods	1	0	3	2
	Electives	2	0	0	2
	TOTAL	11	0	12	15

Electives

Course Code	Course Title	L	T	P	Units
FST 814	Automatic Control Devices	2	0	0	2
FST 816	Advanced Food Microbiology	2	0	0	2
FST 818	Food And Nutrition Policy	2	0	0	2

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
FST 899	Master's Thesis Research Project				12

(c) Ph.D

Course Code	Course Title
FST 999	Doctoral Research Project

7. COURSE SYNOPSSES

A. PGD

FST 700: Course Seminar - 2 Units

Review of literature in the area of Food Science and Technology. Student's write-up will be supervised and graded by assigned lecturer for score up to 40 while the seminar is 60, making a total of 100

FST 701: Food Chemistry - 3 Units

Structural, chemical and physical characteristics of proteins, carbohydrates, lipids and vitamins. Food enzymes and their roles in food systems. Post-mortem changes in meat. Toxicants in foods and their degradation in the body.

FST 702: Fermented Foods - 2 Units

Introductory biotechnology, Handling of traditionally fermented foods (e.g. ogi, nono, iru or ogiri, lafun, gari, etc). yeast production, vinegar production, bread, beer and wine production.

FST 703: Principles of Human Nutrition - 2 Units

Metabolism of carbohydrates, proteins and lipids. Determination of energy requirements and expenditures. Protein energy malnutrition. Nutrition and infection. Micronutrient deficiencies. Nutrition and food additives. Food balance and recommended dietary intake.

FST 704: Food Engineering Operations - 2 Units

Unit operations in food processing – Dehydration, evaporation and size reduction, Evaporation filter, Heat transfer theory; mechanisms and application in food processing. Thermophysical properties of food materials. Basic concepts of flow of fluid foods. Methods of calculating lethal rates, heat penetration value, Newtonian and non-Newtonian fluid heat transfers.

FST 705: Food Process Engineering - 2 Units

Thermodynamic properties of food materials. Basic concepts of fluid flow. Power requirements of pumping fluids in the food industry. Pipeline design, Extraction, distillation, evaporation, crystallization leaching, absorption and membrane separations.

FST 706: Food Laws And Legislation - 2 Units

Need for standards and legislation on raw and processed foods. The Codex alimentarius. The Nigerian food standards and legislation problems, formulations, control/monitoring. Food labeling (its value and limitations). Principles of plant sanitation and personal hygiene.

FST 707: Food Analysis - 3 Units

Chemical analysis of food nutrients. Chemical constituents of deteriorated/spoilt foods. Spoilage factors in food (e.g. total volatile nitrogen in meat products, free fatty acid and peroxide value in fatty foods etc) Colour extraction and determination from foods.

FST 708: Sensory Evaluation of Foods - 2 Units

Quality attributes of foods, such as taste, texture, colour, smell and their characteristics. Mechanism of taste and smell perception. Selection, size and use of taste panel in sensory evaluation of food. Training of tasters. The statistical methods used in taste panel and in quality control. Analysis of data from taste panel results. Flavour profile technique in sensory evaluation.

FST 709: Food Microbiology - 3 Units

Sources and significance of microorganisms in foods. Microbial spoilage of foods; general spoilage principles and determining factors. Food preservation principles and techniques. Microbiology of foods and beverage fermentation and related processes. Microbial food borne infections and intoxications (including mycotoxicosis). Food sanitation; microbiological quality control methods and standards.

FST 710: Computer Applications - 3 Units

Introduction to problem solving methods and algorithm development. Designing, coding, debugging and documenting programmes using techniques of a good programming language style. Computer organization.

FST 711: Food Process Technology - 3 Units

Processing of cereals, legumes, cocoa, tea, coffee, flour and bakery products. Wine and soft drink production. Oil seed processing and utilization. Fish, meat and poultry processing. Manufacture of dairy products. Production of sugar products from tuber and roots. Principles and application of canning of foods. Types of faults in cans. Irradiation principle. Extrusion cooking technology and functional foods.

FST 712: Food Marketing and Management - 2 Units

Advance marketing management problem solving decision. Price determination. Distribution management. Management of the product needs. Analysis of the marketing concepts, marketing philosophies and organization. Relevance of marketing communication into organization's survival. Consumer behavior and consumerism.

FST 713: Fundamentals of Food Quality Control - 2 Units

Fundamental principles of quality control sequences and organization of quality control laboratory. Statistical quality control – types of errors and decision making; control charts for variables and attributes – construction and uses; sampling plan.

FST 714: Food Product Development - 2 Units

Objectives of product development. Stages in food product development. Selection and testing of materials. Development and assessment of food products. Packaging, Pilot plant establishment and assessment. Industrial plant installation and optimization.

FST 799: PGD Research Project - 6 Units

A research project is expected to be fully completed by the student under the supervision of an academic staff. A comprehensive report is to be submitted after the presentation of a Departmental seminar.

B. MASTER OF TECHNOLOGY (M. TECH)**FST 800: Course Seminar - 2 Units**

Students will be expected to carry out literature review on recent developments in an area of current interest in the field of Food Science and Technology. The area of the review should not be directly related to the student's research project. An oral presentation of the review will be presented at an organized departmental seminar. The review will be presented at an organized departmental seminar. The review must be typed, bound and submitted to the department.

FST 801: Statistics and Research Techniques - 2 Units

Experimental planning and designs. Data collection, analysis and interpretation. Use of computer for data analysis. Preparation and presentation of scientific reports.

FST 802: Food Plant Design And Machinery - 2 Units

Materials for construction of food processing equipment. Design of food machinery for canning, drying, heat exchange, size reduction, mixing, evaporation, packaging and cold storage.

FST 803: Food Chemistry - 3 Units

Structural, chemical and physical characteristic of food nutrients. Chemical reactions of protein, carbohydrates, lipids and vitamin. Food enzymes and their roles in food systems. Biochemical changes that occur in food during handling, processing and storage. Toxicants in foods and their degradation.

FST 804: Advanced Food Analysis - 2 Units

Analytical methods such as colorimetry, polarimetry and refractometry. Theory of High performance liquid chromatographic methods, electrophoresis, Gas liquid Chromatography for food analysis. Physical and chemical analyses of major constituents of vitamins, food colours, additives, trace metals and contaminants in food. Atomic absorption spectrophotometry, flame photometry, infra red spectrophotometry, mass spectrometry and their applications in food analysis. Enzymatic methods in food analysis.

FST 805 : Advanced Food Technology - 2 Units

General principles of size reduction of solids. Equipment for slicing, dicing, shredding and pulping. Separation operations including centrifugation, filtration, extraction and crystallization. Mixing of liquids, pastes, powders and emulsification. Preparation of foods for processing. Drying of foods using heated air, hot surfaces and freeze-drying. Principles and equipment for freezing. Heat processing of foods, including

canning, pasteurization and UHT treatments (including physical and chemical changes occurring during the various food processing operations).

FST 806 : Food Biotechnology - 2 Units

Novel biotechnological applications and processes in the food industry, including development in genetic engineering. Enzyme production – application of enzymes in food processing. The production of organic and amino acid. Microbial protein production. Diagnostics and rapid methods in the food industry. Biosensors. Fermented Foods – starter cultures, genetics and biochemical aspects. Hygiene and safety.

FST 807:Advanced Food Quality Control and Plant Sanitation - 2 Units

Principles of quality assurance: quality attributes of food and methods of evaluation. Effects of raw material quality and the various types of food processing method on yield and quality of the products. Microbiology control of food quality. Food plant organization and management. Quality control and operations research in the food industry. Sanitation in the food industry.

FST 808: Advanced Human Nutrition - 2 Units**Selected Topics on Any of The Following:**

- (i) Current reviews on the effects of processing of Nurtitive Values of Foods including fortifications and anti-metabolites' effects after processing.
- (ii) Current reviews on Protein – Energy – Malnutrition (PEM) especially as it affects Nigeria.
- (iii) Current reviews on Micro-nutrients including VITAMINS and MINERALS in human nutrition.
- (iv) Current Reviews on Nutritional disorders emanating from lipid and/or carbohydrate metabolism.

FST 809:Post-Harvest Technology of Fruits and Vegetables - 2 Units

Climacteric and non-climacteric fruits. Biochemical changes accompanying fruits and vegetable ripening. Post harvest losses and estimation in fruits and vegetables. Processing (canning, dehydration, freezing, irradiation, etc); yield and cost calculation.

FST 810: Advanced Food Process Engineering - 2 Units

The flow of fluids under different conditions. Fluid motions and flow of fluids in pipelines. Fittings and pumps. Pneumatics and hydraulic conveying. Transfer of heat by conduction, radiation and convection, and in condensation and boiling. Applications of 1st and 2nd Laws of thermodynamics to heat engines. Steam generation, compression and turbines. Refrigerants, their thermodynamic properties and refrigeration cycle of operation. Food freezing and cold storage. Basic theory of process control. Control systems for pressure, temperature, flow and level. Materials use for construction food plant.

FST 811:Nutritional Evaluation Methods - 2 Units

This course involves the use of experimental animals in Nutritional research. Animal groupings based on age, weight and statistical significance will be taught. Length of experimental periods and collection of urine, faeces and metabolic data will be discussed. Calculation of BV, NPU, PER etc. and haematological studies. Formulation of artificial diets and their significance will also be include. Practicals will be organized using metabolic cages for rats and other small species.

FST 812: Fermentation Technology - 2 Units

Principles of food fermentation: bacteria, yeasts and moulds and their roles in food fermentation. The role of enzymes in food fermentation, factors affecting food fermentation, biochemical and microbiological processes involved in food fermentations; types of fermentors and their uses. Production and characteristics of fermented foods like Alcoholic (beer, enanol) vinegars, lactic acid fermentation (yoghurt, etc). Wholesomeness and nutritional quality of fermented foods.

FST 813 : Food Irradiation Technology - 2 Units

Characteristics of ionizing radiation. Interaction of radiation with matter. Radiation chemistry of foods. Dosimetry of food irradiation. Operation and safety of commercial and research food irradiation facilities. Radiation effects on microorganisms, insects and parasites. Irradiation decontamination of fruits and vegetables, roots and tubers, fish, spices, condiment and export crops. Economic feasibility and consumer acceptability of irradiated foods. Regulatory aspects of food irradiation. Trends in the world trade of irradiated foods.

FST 814: Automatic Control Devices - 2 Units

An overview of process control used in the food industry and future projections to overcome some inherent problems. Response of process controls to different types of signals. Open and feedback control systems, process dynamics and signals.

FST 815:Food Business Management and Planning**- 2 Units**

The purpose and scope of management, development of management thinking and practice. Management peculiarities of food industries. Marketing concept and marketing mix. Food business law. Basic accounting for food industry managers. Preparation of feasibility studies for food based industries.

FST 816 : Advanced Food Microbiology - 2 Units

Characteristics and ecology of microorganisms of importance in food-borne diseases. Methods and techniques of isolation and identification., factors affecting their growth and survival in relation to food processing and preservation. Food sampling. Specialized fermentations including alcoholic, lactic acid fermentations, etc. microbiological criteria for foods, quality assurance, hygiene including appropriate aspects of process plant sanitation.

FST 818: Food Nutrition and Economic Development**- 2 Units**

Conceptual framework for policy development. Food and nutrition situation appraisal. Policy formulation and implementation. Organization, coordination, monitoring and evaluation of food and nutrition policy. Review of agricultural policy in Nigeria.

FST 899: Master's Thesis Research Project - 12 Units

An original investigation in a title approved by the School of Postgraduate Studies. A thesis must be completed with significant contribution to knowledge. The thesis shall be defended in an open oral examination organized by the School of Postgraduate Studies.

(c) Ph.D

FST 999: Doctoral Research Project

LIST OF ACADEMIC STAFF

S/N	Full Name	Rank	Area of Specialisation	Qualification
1.	Prof. Oluwalana, Isaac Babatunde	Professor	Post Harvest Technology	HND (Owo), PGD, M.Sc. (Cranfield), Ph.D (Ife);
2	Prof. Fagbemi, Tayo Nathaniel	Professor	Quality Control/ Food Chemistry & Processing	B.Sc. (Ife), M.Sc. (Ib) Ph.D (Ak).
3	Prof. (Mrs) Osundahunsi, Oluwatooyin.Faramade	Professor	Food Chemistry/ Biochemistry and Product Development	B.Sc (Nsukka)., M.Sc. Ph.D. (Ibadan)
4	Prof. Oluwamukomi, Mathew Olusola	Professor	Food Process Technology/ Product Development	B.Sc, M.Sc (Ife), Ph.D (Ak).
5	Dr. Bolade, Mathew Kolawole	Reader	Cereal processing and Utilization	B.Sc, M.Sc (Ib),Ph.D (Ak);
6	Dr. (Engr) Famurewa, John.Alaba Victor	Reader	Food Engineering	B.Sc, M.Sc, Ph.D (Ib);
7	Dr. Enujiugha, Victor .Ndigwe	Reader	Biotechnology/ Product Development	B.Sc , M.Sc, Ph.D (Ife).
8	Dr. (Mrs) Omoba, Oluwafunmilayo Sade	Reader	Food Processing/ Post Harvest Storage	B.Sc (Ab). M.Sc, Ph.D(Ak)
9	Dr. Badejo, Adebanjo Ayobamidele	Senior Lecturer	Food Biotechnology	B.Sc(Ak),M.Sc,Ph.D (Hiroshima)
10	Dr. Ijarotimi, Oluwole Steve	Senior Lecturer	Human Nutrition	B.Sc,M.Sc(Ib),M.Comm.H(Ifé), M.Phil(Ib); Ph.D (Ak)
11	Dr. (Mrs) Ifesan, Beatrice Olawunmi Temilade	Senior Lecturer	Food and Industrial Microbiology	B.Tech(Ak),M.Tech(Ak),Ph.D(Thailand);
12	Dr. (Mrs) Ayo-Omogie, Helen Nwakaego	Senior Lecturer	Food Microbiology	HND, PGD, M.Sc (Ak), Ph.D (Ogbomoso);
13	Dr. (Engr.) Awolu, Olugbenga Olufemi	Lecturer I	Chemical Engineering	B.Sc(Ak),M.Sc,Ph.D (Ifé)
14	Dr. Malomo, Sunday Abiodun	Lecturer II	Food Processing	B.Tech (Ak), M.sc (Ak), Ph.D (Canada)
15	Dr. Jolayemi, Olusola Samuel	Lecturer II	Post Harvest Storage	B.Tech (Ak), .Tech; Ph.D (Turkey)

9.1.8 DEPARTMENT OF FORESTRY AND WOOD TECHNOLOGY (FWT)

DEGREES BEING AWARDED

- (i) M. Agric. Tech.
- (ii) Ph.D

OBJECTIVES

The objectives of the Postgraduate Degree Programme are to train highly skilled manpower in the science and technology of forest management and utilization. The Programme is designed to extend the frontiers of forestry education and scientific research aimed at increasing the benefits derived from the forest, promoting more efficient forest management and utilization and protecting environmental values.

SPECIALIZATION

At the postgraduate level, areas of specialization within the Department are as follows:

In Forestry

- a. Forest Management
- b. Forest Biology/Silviculture
- c. Soils/Agroforestry
- d. Forest Economics
- e. Forest Inventory/Biometrics

In Wood Technology

- a. Wood Science
- b. Wood Products Technology

ADMISSION REQUIREMENTS

In addition to the University's general regulations and guidelines on admission, graduates in the following disciplines will be qualified for admission:

- (i) Forestry
- (ii) Agriculture and allied fields
- (iii) Botany

(a) M. Agric. Tech.

- (i) Holders of first degree (with minimum of Second Class Lower Division) of the Federal University of Technology, Akure or any other recognized University.
- (ii) Holders of Higher National Diploma (HND) Upper Credit plus Postgraduate Diploma in Forestry related courses with Minimum of 60% average are eligible for admission.

(b) Ph.D.

Holders of Masters degree in relevant disciplines of the Federal University of Technology, Akure or any other recognized University with Minimum of 60% average is eligible for admission.

DEGREE REQUIREMENTS:

1. Master of Agric. Technology (M. Agric. Tech.) Degree

- (i) The M. Agric. Tech. Programme will normally last a minimum of 18 months full-time.
- (ii) The programme is by course work and research and it is geared towards the needs and the background of each student. Thus, while the core courses will be taken by all students, the electives for each student will be determined in consultation with his supervisors or the

Departmental Postgraduate Coordinator. A minimum total of 30 units of study are required for graduation.

- (iii) A dissertation describing an original work carried out by each student while studying for the degree shall be submitted according to University regulations.
- (iv) After the submission of a dissertation, each student shall be examined orally by a Panel of Examiners approved by the Postgraduate School and Senate.

2. Doctor of Philosophy (Ph.D.) Degree

- (i) The Ph.D. programme shall normally last a minimum of 36 months for full-time students and a minimum of 48 months for part-time students.
- (ii) The programme shall be assessed by research work. However, course work shall be required by students found deficient in relevant areas. Such students shall be required to pass a qualifying examination at an average of 60% after completing the course work.
- (iii) A candidate registered for the Ph.D. degree programme must, in consultation with his supervisors, submit a comprehensive research proposal to the Department and present a proposal seminar within the first year of study.
- (iv) On completion of the research work, the candidate is expected to present an end-of-project seminar in the Department. A thesis describing the original work carried out while studying for the degree and written in the format specified by the Postgraduate School must be submitted at the end of the programme.
- (v) After submission of a thesis, the candidate will be examined orally by a Panel of Examiners according to the University regulations.

COURSE OUTLINE

The underlisted core courses shall be taken by all M. Agric. Tech. students in the Department. Specialization courses shall be selected from the list of electives. In addition, students may also take and receive credits for relevant courses at the M. Agric. Tech. level in other relevant Departments. Candidates found to be deficient in certain areas of the undergraduate programme shall be required to audit such courses. The courses offered by the Department at Master's level are as follows:

(a) M.Tech:

FIRST SEMESTER

Course Code	Course Title	U
FWT 801	Biometrics	3
FWT 803	Properties of wood in relation to Utilization	2
FWT 805	Sawmilling	2
FWT 823	Advanced Forest Management	2
FWT 827	Wood Chemistry	2
FWT 890	Research Project	6
	TOTAL	17

Electives

Course Code	Course Title	Units
FWT 807	Wood Harvesting and Transportation	2
FWT 809	Economics of Wood Processing & Marketing	3
FWT 829	Wood Machining and Tools	2

SECOND SEMESTER

Course Code	Course Title	Units
FWT 800	Seminar	2
FWT 812	Social & Environmental Forestry	2
FWT 814	Project Evaluation in Renewable Resources	2
FWT 818	Remote Sensing and GIS in Forestry	3
FWT 828	Research Techniques and Report Writing	2
FWT 890	Research Project	6
	TOTAL	17

SECOND SEMESTER

Course Code	Course Title	Units
FWT 800	Seminar	2
FWT 802	Wood Composites	3
FWT 804	Pulp and Paper Technology	2
FWT 806	Wood Preservation and Seasoning	2
FWT 828	Research Techniques and Report writing	2
FWT 890	Research Project	6
	TOTAL	17

Courses for Postgraduate Programme in M. Agric. Tech. (Forest Management, Economics, Inventory / Biometrics, Silviculture/Biology and Soils/ Agroforestry)

FIRST SEMESTER

Course Code	Course Title	U
FWT 801	Biometrics	3
FWT 803	Properties of Wood in Relation to Utilisation	2
FWT 811	Advanced Silviculture	2
FWT 813	Advanced Forest Mensuration	2
FWT 823	Advanced Forest Management	2
FWT 890	Research project	6
	TOTAL	17

Electives

Course Code	Course Title	Units
FWT 815	Tree Nutrition and Forest Soil Management	2
FWT 817	Agroforestry Systems	2
FWT 819	Quantitative Plant Ecology	2
FWT 821	Forest Resources Economics	2
FWT 825	Resource Inventory Analysis	2
AEE 803	Advanced Economics Theory	2
AEE 805	Quantitative Methods	3

Electives

Course Code	Course Title	Units
WT 816	Land Evaluation for Forestry	2
FWT 820	Advanced Sampling Techniques	2
FWT 822	Selected Topics in Advanced Forest Biometrics	3
FWT 824	Advanced Forest Products Marketing	2
FWT 826	Tree Improvement & Conservation of Genetic Resources	3
AEE 802	Agricultural Prices & Marketing	3
AEE 804	Advanced Production Economics & Resource Use	3

7. COURSE SYNOPSSES**FWT 801: Biometrics (3 Units)**

Basic parametric & non-parametric statistics; Analysis of Variance and its application in various Experimental Designs; Correlation and Regression analysis; Analysis of Covariance.

FWT 802 : Wood Composites (3 Units)

Raw materials, process and production parameters in the manufacture of plywood, particleboard; theoretical consideration, utilization of the panel products.

FWT 803: Wood Properties in relation to Utilization (2 Units)

The anatomy of wood and its relationship with other wood properties – physical and mechanical properties; anisotropy and its influence on methods of wood utilization; moisture/wood relationships; wood deterioration and properties desired from various end uses.

FWT 805 : Sawmilling (2 Units)

General overview of sawmilling, Raw materials for Sawn wood, Sawmilling processes, mill layout, sawmilling products, conversion and mill handling equipment, wood waste

extraction and pollution control measures, raw materials and efficiency calculations.

FWT 806: Wood Preservation and Seasoning (2 Units)
Agents of wood deterioration; methods of wood protection from deterioration. Application of chemical preservatives – non-pressure and pressure methods; methods of wood seasoning and drying defects. Chemical modification of wood to improve dimensional stability and resistance to fire and weathering.

FWT 807: Wood Harvesting and Transportation (2 Units)

Forest Assessment; Harvesting Operation; Principal Equipment for Harvesting; Methods of Log transportation.

FWT 808: Wood Adhesives, Finishes and Fasteners (3 Units)

Introduction to nature of adhesive; structure, properties, application and uses of adhesives in bonding wood products, testing and characterization of bonded wood products; types and application of wood finishes; mechanical wood fasteners.

FWT 809: Economics of Wood Processing and Marketing (3 Units)

Review element of economic theory and economic institutions in relation to business practices; applied economics in relation to the following: Sawmilling, Wood-based panel production, pulp and paper mills; Marketing of wood products, cost structure, productivity and profitability, future trends in wood based industrial development in Nigeria.

FWT 810: Wood Structures (2 Units)

Design of various structural forms of wood. Exterior structures including bridges and marine structures; building specification methods in accordance with the Nigerian Code of Practice (NCP 2:1973); The use of Timber in Building Construction.

FWT 811: Advanced Silviculture (2 Units)

The concept, definition and utility of Silvics; Climatic factors affecting tree growth; Forest stand development; qualitative and quantitative variables of stand evaluation; site classification; planning large scale afforestation project; silvicultural control of wood quality.

FWT 812: Social and Environmental Forestry (2 Units)

Role of social forestry in environmental stability; forestry for rural development; non-timber forest benefits; assessment of environmental conservation measures.

FWT 813: Advanced Forest Mensuration (2 Units)

Growth and increment of individual trees and stands; concept of stand structure and Diameter Distribution models; Site quality assessment; Measures of stand density; Growth and Yield estimation; Modeling forest growth and yield prediction.

FWT 814: Project Evaluation in Renewable Resources (2 Units)

Classification of renewable resource project; project evaluation techniques; Comparison of UDR and IRI;

estimation of costs and revenues; special problems in project evaluation in developing countries.

FWT 815: Tree Nutrition and Forest Soil Management (2 Units)

Nutrient Cycling in Forest ecosystems, Silvicultural implication of nutrient cycling, soil properties and site productivity; nursery soil diagnosis; impact of intensive forestry activities on long-term site productivity.

FWT 816: Land Evaluation for Forestry (2 Units)

Nature and purpose of land evaluation, principle and basic concepts; procedure and planning of land evaluation; forest land utilization types; land use requirements; Survey and land studies; matching land use with land; environmental impact, social and economic analysis; land suitability classification.

FWT 817: Agroforestry Systems (2 Units)

The concept of agroforestry; agroforestry practices in the tropics; classification of agroforestry systems; tree/crop interaction in agroforestry; economic concepts of agroforestry; diagnosis and design of agroforestry systems.

FWT 818: Remote Sensing and GIS in Forestry (2 Units)

Overview of remote sensing applications in forestry; Geographic Information System (GIS) and its use in forestry; vector data analysis; raster data analysis; map production from satellite imageries; hands-on training on the use of selected GIS software.

FWT 819: Quantitative Plant Ecology (2 Units)

Distribution, structure and dynamics of forest and savanna ecosystems; Ecological modeling and systems analysis.

FWT 820: Advanced Sampling Techniques (2 Units)

Survey of literature and application of specialized sampling techniques in natural resources studies. Detailed consideration of relevant probability and non-probability sampling techniques.

FWT 821: Forest Resources Economics (2 Units)

Economic approach to forest production; organization for resource decisions and investment allocation; economics of resource conservation.

FWT 822: Selected Topics in Advanced Forest Biometrics (3 Units)

Mixed models analysis; Compounding and fractional replication in factorial experiments; incomplete block designs; multivariate analysis, such as factor analysis, discriminant analysis and cluster analysis; response surface analysis; other emerging topics in forest biometrics.

FWT 823: Advanced Forest Management (2 Units)

Business methods and technical forestry principles in the operation of a forest property; case studies of management problems with particular emphasis on plantation forestry; applications of operation research in forestry.

**FWT 824: Advanced Forest Products Marketing
(2 Units)**

Analysis of forest products marketing problems; planning marketing programmes; forecasting market trends; sales promotion strategies; analyses of costs and profits.

monitoring of projects; Budget preparation; Ethical considerations in research; Report writing/manuscript writing – research proposal writing, dissemination of research results.

FWT 825 :Resource Inventory Analysis (2 Units)

Manual data processing; Electronic data processing; application of common software for inventory data analysis; introduction to computer programming for forestry applications.

FWT 829: Wood Machining and Tools (2 Units)

Organisation of wood processing operations. Advanced concept on theory of cutting as it applies to wood; Basic operations and tools in the wood industries – sawing, planing, drilling, sanding, etc.

FWT 826: Tree Improvement and Conservation of Genetic Resources (3 Units)

Variation, selection and breeding in tree improvement; Seed Orchards; Clonal and offspring testing; in situ conservation of gene resources.

FWT 830: Research Project (12 Units)

Independent research on topics within the area of forestry and wood technology, chosen in consultation with the student's supervisor. A thesis will be submitted on completion in partial fulfillment of the requirement for the award of M. Agric Tech. degree.

FWT 827: Wood Chemistry (2 Units)

Chemical nature of wood and the analysis of important reactions of their constituents, include cellulose, hemicelluloses, lignin and associated materials.

FWT 832: Finished Products of Wood (2 Units)

Classification of finished products. Design concepts and product development. Basic furniture production processes, industrial products of wood (pre-fabricated wooden houses, boxes, drums, sport articles, boats, musical instruments, match splits, pencils, school articles, etc.).

FWT 828: Research Techniques and Report Writing (2 Units)

Problem identification; Formation of research objectives; Literature review methodologies; Development of appropriate research methodologies; Data collection strategies; Data handling processing and utilization; Administration and

Ergonomics and Labour Relations (2 Units)
Basic concepts of ergonomics, overview of forest work, human aspect of work, Interrelationship between man and work, man's needs in working environment, work safety and accident prevention.

LIST OF ACADEMIC STAFF

S/N	Name	Qualification	Rank	Area Of Specialization
1	Prof. B. Olufemi	B.Sc. M.Sc., Ph. D	Professor	Wood Products Development
2	Prof. J. A. Fuwape	B.Sc. M.Sc., Ph. D	Professor	Wood Science and Biomass Energy
3	Prof. A. O Oluyege	B.Sc. M.Sc., Ph. D	Professor	Wood Science and Products Technology
4	Prof. S.O Akindele	B.Sc. M.Sc., Ph. D	Professor	Biometrics and Forest Inventory
5	Prof. B. Ajayi	PGD. M.Sc., Ph. D.	Professor	Wood Products and Bio-composite Technology
6	Prof. M. B. Oyun	B.Sc. M.Sc., Ph. D	Professor	Silviculture and Forest Biology
7	Prof. J. C. Onyekwelu	B.Sc. M.Sc., Ph. D	Professor	Silviculture and Forest Management
8	Prof. D.O Oke	B. Agric. Tech., M.Agric. Tech., Ph.D	Professor	Agroforestry
9	Prof. V.A.J. Adekunle	B. Agric. Tech., M.Agric. Tech., Ph.D	Professor	Forest Inventory and Ecology
10	Dr. S. A Adeduntan	B. Agric. Tech., M.Agric. Tech., Ph.D	Reader	Forest Biology/Entomology
11	Dr. Mrs. O. V. Oyerinde	B. Agric. Tech., M.Agric. Tech., Ph.D	Senior Lecturer	Forest Economics
12	Dr. A. G. Adedayo	B. Agric. Tech., M.Agric. Tech., Ph.D	Senior Lecturer	Forest Policy and Social Forestry
13	Dr. J. M Owoyemi	FTC, NCE, B. Sc., M.Agric Tech., Ph.D	Lecturer I	Wood Products Manufacturing Technology and Preservation
14	Dr. A. Lawal	B. Agric. Tech., M.Agric. Tech.Ph.D	Lecturer II	Forest Genetics and Tree Breeding

9.2 SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY (SEET)

9.2.1 DEPARTMENT OF AGRICULTURAL AND ENVIRONMENTAL ENGINEERING (AGE)

1. PROGRAMMES OFFERED:

- (a) PGD
- (b) M.Eng.
- (c) Ph.D

2. AVAILABLE OPTIONS / SPECIALIZATION

a) PGD

Agricultural and Environmental Engineering

b) M.Eng:

- (i) Farm Power and Machinery
- (ii) Post Harvest Engineering
- (iii) Soil and Water Engineering
- (iv) Farm Structures and Environment

c) Ph.D:

- (i) Farm Power and Machinery
- (i) Post Harvest Engineering
- (ii) Soil and Water Engineering
- (iii) Farm Structures and Environment
- (iv) Environmental Engineering

3. PHILOSOPHY AND OBJECTIVES

(a) PGD

The PGD programme aims at providing appropriate training and education to holders of Higher National Diploma in Agricultural and Environmental Engineering, Food Science and Technology, Agriculture and other relevant disciplines who want to pursue a career in Agricultural and Environmental Engineering and industry. The candidates are trained to have a broad knowledge in all aspects of Agricultural and Environmental Engineering, including Farm Power and Machinery, Soil and water, Processing and Storage, Livestock engineering as well as Farm Structures and Environmental Control. Such candidates should be able to satisfy the requirements for professional registration by the NSE and COREN on graduation

(b) M. Eng.

In order to have an in-depth knowledge of the basic principles underlying the body of knowledge, candidates are trained for the award of M.Eng degree in Agricultural and Environmental Engineering. Such candidates are trained to develop a broad analytical mind that would enhance major intellectual and technological breakthroughs to improve agricultural production. Furthermore, the M.Eng.degree is offered such that the students are adequately versed in their discipline and be competent in imparting the knowledge to others in a conducive academic environment to ensure the continued existence of the system.

(c) Ph.D

Ph.D candidates are trained to develop a broad analytical mind that would enhance major intellectual and technological breakthroughs to improve agricultural production.

Furthermore, the Ph.D. degree is offered such that the students are adequately versed in their discipline and be competent in imparting the knowledge to others in a conducive academic environment to ensure the continued existence of the system.

4. ADMISSION REQUIREMENTS:

a) PGD

The Admission Requirements include: All candidates must possess an HND in Agricultural and Environmental Engineering; Food Science and Technology, Engineering and other relevant disciplines with a minimum of Lower Credit.

b) M. Eng:

The admission requirements include:

- i. B.Sc or B.Eng. degree in Agricultural and Environmental Engineering or related discipline with at least Second Class.
- ii. PGD in Agricultural and Environmental Engineering with at least Upper Credit pass.
- iii. M.Eng. or M.Sc. in any engineering discipline with average score of 60%

c) Ph.D:

The admission requirements include:

- i. M. Eng or M. Sc in Agricultural and Environmental Engineering with a minimum score of 60%.
- iii. M.Eng. or M.Sc. in any engineering discipline with average score of 60%.

5. DURATION OF PROGRAMME

(a) PGD

The programme is for a minimum of four (4) semesters of course work and project.

(b) M. Eng

A minimum of 18 months and maximum of 24 months is required for the full time M. Eng. programme, including course work and project.

(c) Ph.D

See the University regulation on this

6. REQUIREMENTS FOR GRADUATION

a) PGD

To qualify for the award of Postgraduate Diploma in Agricultural and Environmental Engineering, a candidate must have been credited with a least 64 units of compulsory courses, which include the project report.

b) M. Eng:

Candidates for the award of M.Eng.degree in Agricultural and Environmental Engineering must satisfy the following requirements:

- i. Pass all prescribed courses offered in both first and second semesters;
- ii. Conduct a prescribed project work and submit the required number of copies of thesis for examination.
- iii. Present a seminar on his or her project work on completion, and before the viva
- iv. Perform satisfactorily during the Oral examination (viva) of his thesis, and
- v. Revise and submit the required number of copies of the thesis after examination.

c) Ph.D

Candidates for the award of Ph.D degree in Agricultural and Environmental Engineering must satisfy the following requirements:

- i. Pass all prescribed courses offered in the first session;
- ii. Conduct a prescribed research work and submit the required number of copies of thesis for examination.
- iii. Present at least three seminars before the viva.
- iv. Perform satisfactorily during the Oral examination (viva) of his thesis, and
- v. Revise and submit the required number of copies of the thesis after examination.

7. COURSE OUTLINE

(a) PGD: 1ST Year

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
AGE 711	Engineering Mathematics I	2	1	-	3
AGE 717	Machine Design and Drawing	2	-	3	3
AGE 719	Fluid Mechanics	2	-	3	2
AGE 713	Statistical Method for Engineers	2	1	-	2
AGE 723	Engineers in Society	2	-	-	2
AGE 721	Mechanics of Machine	3	1	-	3
	TOTAL				15

Electives

Course Code	Course Title	L	T	P	U
AGE 741	Engineering Drawing	2	-	3	3
AGE 725	Strength of Materials	1	-	3	2

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
AGE 712	Engineering Mathematics II	2	-	-	2
AGE 714	Heat and Mass Transfer	2	-	3	3
AGE 716	Energy Application in Agriculture	2	-	-	2
AGE 718	Introduction to Engineering Materials	2	1	-	2
AGE 720	Surface and Ground Water Hydrology	2	-	-	3
AGE 722	Numerical Methods and Computer Programming	2	1	-	3
	TOTAL				15

Electives

Course Code	Course Title	L	T	P	U
AGE 724	Handling and storage of Agricultural Products Drainage	2	-	3	3
AGE 726	Drainage	2	-	-	2
AGE 728	Engineering Properties of Structural Materials	2	-	-	2

2ND YEAR

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
AGE 715	Farm Power	2	1	-	3
AGE 727	Farm Structures Design	2	-	3	2
AGE 729	Technical Writing and Presentation	2	-	-	2
AGE 731	Management Law and Entrepreneurship	2	1	-	3
AGE 733	Farm Tractor and Equipment Maintenance	2	-	3	2
AGE 735	Food Processing and Plant Design	2	1	-	3
	TOTAL				15

Electives

Course Code	Course Title	L	T	P	U
AGE 737	Farm Electrification	1	-	3	2
AGE 739	Irrigation	1	-	3	2
AGE 743	Engineering Properties of Biomaterials	2	-	3	3

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
AGE 804	Soil-tillage dynamics	2		3	3
AGE 806	Energy Sources &Utilisation in Agric	2		3	3
AGE 808	Advanced Agric. Machinery & Equipment design	2		3	3
AGE 812	Tractor design	2		3	3
AGE 899	Research project	-		-	6
	TOTAL				18

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
AGE 730	Farm Machinery	2	-	3	2
AGE 732	Land Cleaning and Development	2	-	-	2
AGE 734	Rural Water/Supply and Sanitation	2	-	-	2
AGE 736	Farmstead Planning and Control	2	1	-	2
AGE 799	Project	2	-	-	6
	TOTAL				14

Electives

Course Code	Course Title	L	T	P	U
AGE 738	Environmental and Waste Management Engineering				2
AGE 740	Crop Processing Techniques	2	-	3	3
AGE 742	Theory of Cultivation Practices	2	-	-	2

(b) M.ENG**Farm Power and Machinery Option****FIRST SEMESTER**

Course Code	Course Title	L	T	P	Units
AGE 801	Research Methodology/ Experimental Design & Analysis of Experiments	2		-	3
AGE 803	Instrumentation and Control	2		3	3
AGE 805	Advanced Production Technology	2		3	3
AGE 807	Systems Engineering in Agriculture	2		-	3
AGE 811	Rheological Properties of Agric. Mat'l's	3		-	3
AGE 813	Advanced Agric. Machinery	2		3	3
AGE 899	Research Project	-		-	6
	TOTAL				24

Post Harvest Engineering Option**FIRST SEMESTER**

Course Code	Course Title	L	T	P	Units
AGE 801	Research Methodology/ Experimental Design & Analyses of Experiments	2		3	3
AGE 803	Instrumentation and Control	2		3	3
AGE 807	System Engineering in Agriculture	2		-	3
AGE 833	Advanced Thermodynamics	2		3	3
AGE 835	Engineering Properties of Agric Materials	2		3	3
AGE 837	Advanced Storage Technology	2		3	3
AGE 899	Research Project	-		-	6
	TOTAL				24

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
AGE 832	Heat and Mass Transfer	2		3	3
AGE 834	Advanced Food Engineering	2		3	3
AGE 836	Alternative Energy and Solar Application in Storage, Drying and Processing	2		3	3
AGE 838	Material Handling Technology	2		3	3
AGE 899	Research Project				6
	TOTAL				18

Soil and Water Engineering Option

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
AGE 801	Research Methodology/ Experimental Design & Analysis of Experiments	2	-		3
AGE 803	Instrumentation and Control	2	3	3	
AGE 807	Systems Engineering in Agriculture	3	-		3
AGE 821	Bioclimatology	2	3	3	
AGE 823	Irrigation and Irrigations Systems	2	-		
AGE 827	Advanced Drainage Systems	2	3	3	
AGE 899	Research Project	-	-		6
	TOTAL				24

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
AGE 824	River and Canal Hydraulics	2	3	3	
AGE 826	Water Resources Engineering	2	3	3	
AGE 828	Groundwater Development	2	3	3	
AGE 830	Dams	2	3	3	
AGE 899	Research project	-	-		6
	TOTAL				18

Farm Structures and Environmental Control Option

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
AGE 801	Research Methodology/ Experimental Design & Analyses of Experiments	2	-		3
AGE 803	Instrumentation and Control	2	3	3	
AGE 807	System Engineering in Agriculture	3	-		3
AGE 841	Elements of Structural Analysis	3	-		3
AGE 843	Engineering properties of materials of construction	2	3	3	
AGE 845	Farmstead planning and building environment	3	-		3
AGE 899	Research Project	-	-		6
	TOTAL				24

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
AGE 840	Buildings and Environments for Animal Production	2		3	3
AGE 842	Elements of Structural Analysis II	3		-	3
AGE 844	Building Construction and Surveying	2		3	3
AGE 846	Buildings and Environments for Crop Production	2		3	3
AGE 899	Research Project				6
	TOTAL				18

c) Ph.D:

For candidate who do not possess an M.Eng or M.Sc in Agricultural and Environmental Engineering or whose transcripts indicate deficiencies in some required courses, the Department shall prescribe some courses, which must be offered during the first year of the programme

9. COURSE SYNOPSIS

(a) PGD

AGE 711: Engineering Mathematics I (3 units)

Review of matrix operation including inversion, Eigen values, Eigen vectors and Canonical transformations and application. Three dimensional vector representations, vector calculus, gradient, divergence and curl line, surface and volume integrals, laplacian operations. Green's Stoke's and Divergence theorems and applications. Ordinary and partial differential equations, applications and physical problems. Complex variables, numerical analysis, special functions and integral, problem formulation, simple method of solution.

AGE 712: Engineering Mathematics II (2 units)

Complex variables: function, deviation, language series, Taylor series, Cauchy theorem, Cauchy formula, Cauchy integrals. Analytic functions, singular points, residual problems, conformal problems and mapping. Special functions: Gamma, Delta, Beta and error functions. Fourier integrals, Fourier transforms for solving partial differential equations.

AGE 713: Statistical Methods (2 Units)

Descriptive Statistics: Central tendencies and dispersion. Elementary probability theory, Conditional probability, Baye's theorem, probability distributions and applications. Elementary theories of sampling and estimation. Test of hypothesis and significance. Curve fitting, linear and estimation. Test of hypothesis and significance. Curve fitting, linear and multiple regression analyses; linear correlation, analysis of variance, time series analysis. Statistical quality control; etc.

AGE 714: Heat and Mass Transfer (3 units)

Heat transfer by conduction: One-dimensional heat conduction problems and solution. Fourier's equation using energy conservation approach, steady and unsteady state 2 – D heat conduction (Laplace equation, Poisson's equation). Dimensionless variables of heat conduction. Heat transfer by convection: Basic equations of heat convection. Free and forced convective. Dimensionless numbers and similarity. (Reynolds, Prandtl, Grashof, Rayleigh, Stanton, Nusselt, Froude and Görtz numbers). State Buckingham - pi theorem, boiling and condensation. Heat transfer radiation: Electromagnetic spectrum, thermal radiation spectrum emissivity, reflectivity, transmissivity, absorptivity, emissive power. Real and ideal surfaces. Total and monochromatic radiation. State Kirchhoff's law, Wien's displacement, Stephan – Boltzman's law. Direct exchange between black and grey surfaces, exchange in enclosures with non-participating medium. Heat Exchangers: Functions of heat exchangers. Basic types of heat exchangers. Analysis of heat exchanger using the Logarithmic Mean Temperature Difference (LMTD) and number of transfer units (NTU) methods. Mass transfer: Definition of momentum transfer. Navier-Stokes' equation analysis of boundary layer theory, boundary layer thickness, drag, boundary layer control. Flow through conduits and over submerged bodies (flat plates, cylinders and spheres) 30h (T); 45h (P).

AGE 715: Farm Power (3 units)

Farm Power sources. Forces analysis and power measurement on tillage tools, types, classification and operating principles of internal combustion engines, types of engine cycles. Efficiencies of engine cycle. Engine combustion processes. Engine operation systems: the fuel systems, cooling systems, ignition systems, lubrication systems, and turbo-charging.

AGE 716: Energy Application in Agriculture – (2 units)

Energy needs for farming (field and farmstead uses) processing of agricultural crops and village communities. Human labour. Energy and power consumptions and outputs of various work activities, work rates and rest, human work assessment. Draught animal power: Characteristics and capabilities of various species for transport draught operations in the field and use with animal power. Gears: Characteristics and selection for various agricultural purposes; alternative fuels and alternative types of engine; power transmission by belt driven. Electrical power installations: motor characteristics and selection, control gear, systems of wavy, safety, applications (case study/ design), diesel generation. Other energy sources. Solar energy, collectors, cells, stores energy converters, costs, wind energy, wind characteristics, type of turbines, applications, costs, biomass and derivatives. Energy strategy, assessment of needs and availability for typical agricultural, processing and domestic purposes, balanced use strategy.

AGE 717: Machine Drawing and Design (3 units)

The course synopsis includes; machine drawing, machine design concepts, processes and procedures. Identification of basic machine components. Design Techniques including conceptual drawings, computer aided designs, orthographic, isometric and component drawings of machines and machine components. Design of machine elements such as shafts, belt drives. Part assembly, detail drawing of machine components. Sketching and use of standards, design, features, symbols, screws, fasteners, couplings, clutches, gears, and machine components design. Presentation of design portfolio.

AGE 718: Introduction to Engineering Materials (2 units)

Characteristics and manufacturing methods of construction materials. Cement, sand lime, bricks tiles, mortar, concrete, timber, steel, G.I sheet, AC sheet, use of materials modern engineering materials and materials for special purposes.

AGE 719: Fluid Mechanics (3 units)

Elements of fluid static, pressure, surface tension, viscosity, compressibility, etc. Hydrostatic forces on submerged surfaces due to incompressible fluid. Introduction to fluid dynamics, conservation laws, introduction to viscous flow. Fluid properties. Fluid statics. Fluid motion: continuity Bernoulli, energy, momentum equations. Reynolds number. Dimensional analysis.

AGE 720: Surface and Groundwater Hydrology (3 Units)

The hydrologic cycle. Agro-climates and temperature/moisture limits to the growing season. The precipitation process and rainfall types. Precipitation measurement. Point rainfall analysis. Depth and depth-area-duration analysis. Evapo-transpiration and methods of its estimation. Runoff duration analysis. Stream gauging. Stream flow hydrographs, flood routing. Groundwater hydraulics. Quality control in hydrologic data analysis. Frequency analysis. Types and principles of groundwater production methods. Types, designs, construction, installation, operation, maintenance and retrieval of groundwater production equipment. Rigs, Pumps casting screw and mats.

AGE 721: Mechanics of Machines (3 units)

The course synopsis includes; Review of general dynamics: Velocity, acceleration, Newton's laws of motion, energy and its conservation. Types and functions of mechanism. Types and application of motion. Motion transmission in belt drives, gear drives and chain drive. Analysis of cams and followers, gear drives, chain drives and belt drives for motion and power transmission. Kinetics and balancing of rotating masses and elements of vibratory system. Simple harmonic motion and degrees of freedom. Vehicular mechanics: brake and clutch systems.

AGE 722: Numerical Methods & Computer Applications (3 units)

Gaussian elimination, Gauss-Seidel methods and Newton-Raphson Heron methods of solving linear equations. Forward and backward difference tables, central difference formula, finite difference solution to practical differential equations. Solutions of ordinary differential equations (1st and 2nd order) using Runge-Kutta method. Flow charting, Algorithms, inputs and output, Basic, FORTRAN and Modern Languages. Computer software analysis, Highway/Transportation, geotechnical, Hydraulics/Hydrology Problems and construction management ICT.

AGE 723: Engineer-in-the-Society (2 units)

Philosophy of science, History of engineering and technology. Safety in engineering and introduction to risk analysis. The role of engineers in nation building. Invited lectures from Professionals

AGE 724: Handling and storage of Agricultural Products (3 Units)

Review of handling techniques. Design and selection of conveying systems including belt, chain, bunker, vibratory, pneumatic and screw conveyors. Grain handling systems, forage and hay handling systems. Fruits and vegetables handling systems. Mechanical damage to agric. Products during harvesting, transportation and processing. Economics of material handling. Rural storage systems in Nigeria. Design of storage methods of control: fumigants, insecticides, etc storage systems for various crop including refrigeration and frozen storage systems. Containerization of Agric. Products. Determination of products in storage. Environmental control in storage.

AGE 725: Strength of Materials (2 units)

Force equilibrium – free-body diagrams. Concept of stress, strain: Tensile tests. Young's' modulus and other strength factors. Axially loaded bars, composite bars, temperature stresses and simple indeterminate problems. Hoop stress, cylinders, rings. Bending moments, shear force and axial force diagrams for simple cases. Simple torsion and application.

AGE 726: Drainage (2 units)

Surface drainage. Sub-surface drainage. Design of drainage systems. Envelope, Materials and their design. Loads of conducts Drainage pumping. Construction and installation of drains, Maintenance of drains.

AGE 727: Farm Structures Design (2 units)

Introduction to Agricultural Structures. Selection of materials in relation to use-wood, concrete and masonry. Types of structural frames. Introduction to structural design-philosophy of design. Elastic and plastic design concepts. Reinforced concrete design. Design of beams, slabs etc. NOTE: for all designs, wood, steel and concrete are to be considered.

AGE 728: Engineering Properties of Structural Materials (2 units)

Types of structural materials. Wood, concrete, structural steel etc. properties of structural materials: Concrete: compressive strength, composite materials, aggregate size, water cement ratio, ultimate strength, design of concrete mixers, finesse modulus, consistency, curing and testing method, compression, stress-strain diagram, sizes, diameters wood: Classification of wood, cellular makeup, moisture content and shrinkage, stress grades and design values, bending, tension, parallel to grain, modules of elasticity, moisture content factor, duration of load factor, timber drying and storage, wood fasteners.

AGE 729: Technical Report Writing (2 units)

Principle of communications. Preparation and writing of technical reports. Oral presentation. Use of visual aids and other communication equipment in technical and research presentations.

AGE 730: Farm Machinery (2 units)

Tractors use in farming. Constructional features of tractor. Tillage: objectives and principles of Tillage. Primary and secondary tillage equipment. Ploughs: components and operations. Principal type: implement for seedbed preparation. Equipment for sowing and planting. Equipment for distributing and treating manures. Equipment for crop protection. Silage making and feeding. Forage harvesting: cutting and swath treatment combine harvester. Root harvesting machinery. Seed clearing and feed preparation. Equipment for livestock husbandry. Equipment for milk production.

AGE 731: Law Management and Entrepreneurship (3 units)

Principles of management. Industrial group and organizational behaviour. Motivation. Industrial law, legislation on wages, trade marks and patents, law of contracts and sales of goods. Liability for industrial injuries. Industrial relations. Trade unions, employer associations, wages bargaining and role of the state. Relevant topics on entrepreneurship designed by the National Universities Commission for Nigerian Universities.

AGE 732 Land Clearing and Development (3 units)

Land resources and land use Acts in relation to Nigeria agriculture. Objectives, methods and equipment for land clearing and development. Machinery selection, machines of operation and vegetation types land reclamation. Earthmoving machinery and earth moving mechanics.

AGE 733: Farm Tractor and Equipment Maintenance (2 units)

Importance of maintenance. Basic Theory of reliability. Reliability of tractors and automobiles. Routine Services, repairs and maintenance schedule machine diagnosis. Preventive maintenance of lubrication systems, cooling

system, ignition system, electrical system, hydraulic system, power transmission and chassis. Theory of interchangeability. Technology of repair of basic elements of farm equipment.

AGE 734 Rural Water Supply and Sanitation (2 Units)

Water Requirements. Water quality standards. Water borne diseases. Biochemical oxygen demands. Potable water impurities. Sources and treatment methods of water for rural homes. Water lifting devices. Transportation and distribution systems. Pipe sizes. Waste disposal in rural communities. Collection, conveyance, treatment and disposal of sewage from rural homes. Septic tanks, digestion ponds and family privies.

AGE 735: Food Processing and Plant Design (3 units)
Theology of slurries and pumping of non-Newtonian materials as homogenous and heterogeneous suspension. Characteristics and selection of pumps. L Mixing theory and determination of degree of mixing. Mixing machine characteristics applied fluids, powders and pasts. Process modeling of mixers by dimensional analysis. Separation techniques of solid/liquid regimes including filtration, sedimentation, centrifuging. Milling of grains comminution and fracture mechanism, characteristics of selected seeds, cleaning machines. Design and fabrication of food process equipment.

AGE 736: Farmstead Planning and Control (2 units)
Definition of farmstead. Farmstead planning and layout. Family housing. Livestock housing. Structures for farmstead products and food storage etc. Environmental control. Structural requirement of crops and live stocks.

AGE 737: Farm Electrification (3 units)

Electrical codes, tariffs and regulations. Generation and transmission of electricity, farmstead distribution systems. Testing procedure. Power factor correction. Selection and use of electric motors. Transformers. Energy conversion. Application of electricity to processing and storage of agricultural products. Basic electronic application to farm electrical processes.

AGE 738: Environmental and Agricultural Waste Management (2 Units)

Sources, Characteristics and Types of Agricultural Wastes. Control, treatment and disposal of solid wastes. Control, treatment and disposal of liquid waste and slurry. Conversion and utilization of agricultural waste. Environmental impact assessment of agricultural processes and operations. pollution of water, air and land by agric process and bio-waste and control.

AGE 739 Irrigation (2 Units)

Design of open channels. Water flow measurements. Pumping power requirements. Design of irrigation systems. Border, sprinkler, drip, etc. Choice of method field management, irrigation scheduling, salinity and quality of

irrigation water. Reclamation of saline and alkaline soils. Seepage from canal lining. Systems control methods: Continuous supply; rotation; on-demand and system automation. Irrigation agronomy experiments. Irrigation water management.

AGE 740: Crop Processing Techniques (3 Units)

Cleaning, sorting, grading and separation principles, technique and machine. Particle size size analysis and reduction. Feed grinding and mixing. Processing systems for seeds, grains fruits, vegetables, poultry, meat, milk, forage process conditions, observations and controls. Process analysis and plant design.

AGE 741: Engineering Drawing (3 Units)

Introduction to Engineering drawing. Engineering graphics. Development and intersection of curves and solids. Projections: Lines, planes and simple solids. First and third angle projections; orthographic, auxiliary and isometric projections. Simple examples. Threads, fasteners, etc. Pictorial/free-hand sketches.

AGE 742 Theory of Cultivation Practice (2 Units)

Cultivation in agriculture and irrigated agriculture. Soil types and properties. Bulk shear strength, inter face sliding resistance; soil strength soil consistence variations. Implement-soil interaction. Implement resistance on Soil. Draught resistance safety devices on implement during cultivation. Ideal soil conditions for performing basic cultivation. Selected of equipment for various farm operation based upon operating soil and other related conditions.

AGE 743: Engineering Properties of Biomaterials (3 Units)

Physical, Mechanical, rheological and thermal properties of Agricultural Materials. Newtonian and non-Newtonian fluids. Fluid types and viscometry.

AGE 799: Project (6 Units)

Two semesters of practical project under the supervision of an academic staff who is registered or registerable with COREN. The project report must be submitted and an oral examination must be conducted.

(b) M. Eng

AGE 801: Research Methodology/ Experimental Design & Analysis – 3 units

(a). Research Methodology

Objective and scope of research ; Modelling; Model verification; Research procedure; Time scheduling; and material selection and allocation; Collection of data; Laboratory and workshop investigations works-study; Preparatory of report; Studies of selected problems which illustrate various research techniques.

(b). Experimental Design & Analysis

Statistical methods; Definition of statistical terms; The representation of numerical data; Measures of dispersion; Distributions: binomial, poisson, normal; Statistical significance:

normal distribution test, and test; confidence limit and confidence interval, variance ratio test (f-test), least, significance difference (L.S.D.) test, X^2 -test; Regression and correlation; Comparative experiments: design, replication, randomization, latin squares, balanced incomplete block designs; (office design)., Fractional experiments: design, analysis, and determination of optimum conditions.

AGE 803: Instrumentation and Control - 3 units

Estimation of errors; Theory of basic instrumentation, transducers, and controllers; and application to Agricultural and Environmental Engineering problems; Agricultural measurement systems: Soil, Water and humidity devices and instruments for quality evaluation and control of agric. products. Measurement of product maturity and ripeness; Inspection of graine and seeds, animal carcass, quality and milk fat analysis; Stress-strain measurement; Temperature measurement; Static and dynamic measurement.

AGE 805: Advanced Production Technology - 3 units

Production Planning and Control. Sheet metal fabrication by forming and stamping. Influence of material parameters on formability and die design. Techniques in moulding and casting. Fits and Tolerances. Metal Machining, machine - tools and instruments. Jigs and Fixtures Materials, equipment and processes for fabrication of plastics. Theory and applications of welding processes, factors affecting weldability, consideration in the design of welded component. Workshop metrology. Equipment and planning in Agricultural machinery maiintenance and service plants. Assembly operations. Advanced methods in production e.g. die-casting, Rolling, Extrusion, Wire Drawing, Forging etc.

AGE 807: Systems Engineering in Agriculture - 3 units

Systems definition and concept; Systems design process; Models and algorithms; Allocation of resources; Linear programming; Integer programming; Non-linear programming: separable and anadrotic programming; Dynamic programming; Transportation analysis; Locational analysis Network analysis; Queuing theory; Replacement theory; Inventory theory; Simulation ; Sensitivity analysis; Primal and dual formation; The above optimisation techniques are to be applied to mechanized agricultural production systems.

AGE 811: Rheological Properties of Agric. Materials - 3 units

Importance of rheological properties in agriculture); Classification of agricultural materials and identification of rheological properties; Principles of stress, deformation and flow; Vector and tensor equations of fluid mechanics; Behaviour of Newtonian, non-Newtonian and Visco-elastic fluids; Experimental determination of rheological properties using fundamental methods and empirical textural measurements; Treatments for modification of rheological properties.

AGE 813: Advanced Agricultural Machinery - 3 units

Review of common agric. Machinery; Farm implement controls; Fruit and vegetable harvesting; Forage harvesting machinery; Specialized harvesting machinery; Livestock production ;machinery; Development in agricultural machinery; Selection of power units for mechanized agriculture; Agric. Machinery selection and utilisation analysis.

AGE 802: Advanced Storage and Processing Engineering - 3 units

Engineering principles involved in mechanical handling, conditioning and storage of agricultural products. Application of refrigeration, electric energy and physical properties of agricultural products. Heat and mass transfer applications for drying, dehydration and freezing. Design of equipment and facilities in storage buildings.

AGE 804: Soil-tillage Dynamics - 3 units

Dynamic properties of soil; Soil reactions to forces: retaining wall and bearing capacity theories; general soil mechanics equations; soil/soil shearing, soil/interface sliding, soil failure with tines, soil compaction, wheel and track performance in soil. Forces acting upon a tillage implement and their measurements; Mechanics of tillage; Tillage tool design factors; Measurement of hitch forces on mounted and semi-mounted implements; Mechanics of traction and transport; Tillage implement-tractor relationships; Tillage and cultivation practices.

AGE 806: Energy Sources and Utilisation in Agriculture - 3 units

Sources of energy; Problems of meeting the growing energy demand; technical, economic and political considerations engineers balance in selecting and energy source, advantages and disadvantages of each energy source. Overview of energy uses, resources, energy conversion, technology and environmental problems, current and future energy systems: nuclear, fosil fuel, geothermal, solar and others. Determination of energy requirements; Measurement of energy; Conversion of energy. Economy of energy usage.

AGE 808: Advanced Agric. Machinery and Equipment Design - 3 units

Mechanical and experimental analysis of selected mechanisms used in agricultural machine, Advanced Kinematics and dynamics of motion in three dimensions. Vibration theory with application to vibration absorption and isolation, critical analysis of force and stress on components of agricultural machines, Mechanics and design of traction and transport devices. Hydraulic controls. Design of post-harvesting systems.

AGE 812: Tractor Design - 3 units

Theory and application of hydraulic and power transmission systems used in tractors. Laboratory practicals to related to the functional requirements of tractors. Pneumatics and its

application to Agric. Engineering systems; Applied thermodynamics, design of internal combustion engine for tractive power, lubrication system, design of control system. Tractor test and performance.

AGE 831 Principle and Theory of Grain Drying - 3 units

Nature of water in Agricultural Material. Moisture migration in Agricultural Material. Drying, dehydration and irradiation. Drying rate and drying constant. Psychometric properties of air. Air movement in grain. Dryer types and classification. Cross flow, concurrent flow and counter flow dryers, Continuous flow and batch flow dryer. Energy sources for drying. Dryer Design. Simulation of drying process.

AGE 832 Heat and Mass Transfer - 3 units

Laws of conduction, convection and radiation. Steady state conduction through solids, and from fluid to fluid. Thermal conductivity, diffusivity and differential. Lagging and insulation. Estimation of heat gains and losses through solids and fluid lagging and insulation. Heat transfer through single layer slab, single layer cylinder wall, multiple layer composite cylindrical wall. Transient conduction. Refrigeration and heat exchanger. Movement of moist air and heat in thin and dense grain layer. Theory of mass transfer.

AGE 833 Advanced Thermodynamics - 3 units

Review of system, state, properties and processes. Energy conservation and its thermodynamic applications. Flow and non-flow processes. Laws of thermodynamics. Steady flow energy equation. Psychometric and thermodynamic properties of drying air. Refrigeration system and heat pumps.

AGE 834: Advanced Food Engineering - 3 units

Food classifications. Particle size distribution and analysis. Mode of heat transfer. Heat exchangers. Fruit and vegetable processing. Pre cooling, soaking, washing, sorting, grading, peeling, cooling, cutting, blanching, etc. Tuber crop processing. Cereal and grain processing. Meat, fish and dairy processing. Juice and marmalade production. Food packaging, food preservation techniques. Plant design. Machinery for food processing. Food analysis and quality control.

AGE 835: Engineering Properties of Agricultural Material - 3 units

Nature and behaviour of Agricultural Material. Newtonian and Non-Newtonian fluid. Physical properties. Mechanical properties. Aerodynamic properties, Rheological properties. Rheological models. Aerodynamic models and theories. Hydrodynamic properties. Chemical and biological properties., Thermal properties. Electrical and Electronics properties. Optical properties.

AGE 836 Alternative Energy and Solar Applications in Storage, Drying and Processing - 3 units

Conventional energy sources. Alternative energy sources. Thermal energy. Mechanical energy. Chemical energy. Wind energy. Geothermal energy. Hydrothermal energy. Electrical energy. Solar energy. Law of conservation of energy. Energy conversion Harvesting and utilization of solar energy. Solar collectors, dryers, incubators, water heater, cooker etc. Design of solar system. Nuclea and fossil energy.

AGE 837 Advanced Storage Technology - 3 units

Review of storage systems. Moisture isotherm factors affecting grain storage systems: structural, biological, physical, chemical, climatic technical thermodynamic, insects pests and rodents. Classification of storage system small/ medium scale storage system: Evaporative cooling system (ECS), crib, traditional storage, pit, barn, etc. Short and long term storage. Large scale storage systems with emphasis on silo and warehouse. Controlled atmosphere (CA) storage systems: Cold and hermetic storage. Storage system accessories. Design of storage structures with emphasis on silo and cold storage systems.

AGE 838: Material Handling Technology - 3 units

Classifications of material handling equipment theory of agricultural material transport. Belt conveyor, bucket elevator, screw conveyor, chain conveyor and pneumatic conveyor. Specifications and standards for material handling equipment. Material handling and temporary storage. Design of material handling equipment. Packaging system. Characteristics of packaging materials and types of packaging systems.

AGE 839: Fish, Meat and Dairy Storage, and Processing - 3 units

Fish and seafood classification. Fish processing, Meat processing (beef, pork and poultry. Tendering and curing of meat and fish products. Preservation methods such as smoking, freezing, canning, irradiation, drying, refrigeration, etc. Controlled atmosphere storage for meat, fish and dairy products. Abattoir management. Dairy products - Filter milk, iced cream, cheese, butter, cultured milk, etc condensation, dehydration, classification, homogenisation, pasteurisation and sterilization. Oil extraction from fish and animal products. Design of machines for processing fish, meat and dairy products. Management of waste generated from fish, meat and dairy processing selected, a pass in the oral examinations and a successful completion of the research project.

AGE 821: Bioclimatology – 3 units

Radiation - radiation laws, radiation in natural environments and in plant communities. Radiant energy balance plant-water relations soil-plant-atmosphere continuum. Energy balance and evaporation; Temperature, Wind. Drought and drought tolerance. Photosynthesis and respiration.

AGE 823: Irrigation and Irrigation System - 3 units
Irrigation methods: Surface, sprinkler, trickle and sub irrigation. Criteria for method of selection. Estimation of irrigation water requirements. Water conveyance distribution systems. Irrigation system layout. Irrigation scheduling. Design discharge in irrigation net works for water delivery. Irrigation canal alignment and design, canal lining. Fundamentals of irrigation structures design. Design criteria and procedures for regulating structures, conveyance structures, protective structures and energy dissipators. River diversion weirs and canal intakes Layout of surface irrigation land levelling.

AGE 824: River and Canal Hydraulics - 3 units

Basic hydraulic concepts; Pipe flow and pipeline systems; Open channel flow; Pumps and turbines; Design applications for pipelines, channels and pumps. Properties of sediment transport theories and applications in design. Head-works, sediment excluders, solid weir crests, energy dissipators, siphons.

AGE 826 Water Resources Engineering

Ecological cycles. Surface water hydrology and hydrometry; Data collection, data management and analysis; Resources assessments, catchments and reservoir yield. Flood flow analysis; Properties of aquifers and yield assessment.

AGE 825: Advanced Soils Conservation Techniques - 3 units

Soil Science - Management of soil resources. Pedology, soil chemistry and the properties of soil water; Practical techniques for evaluating the important of soil water characteristics, including infiltration, seepage and drainage. classification of soils. Soil erosion and degradation. Soil conservation.

AGE 827: Advanced Drainage Systems - 3 units

Design of land drainage systems for sustainable agriculture surface, shallow and ground water drainage systems. Design criteria for sub-surface drainage systems in humid and arid areas. The reclamation and control of salinity in salt affected land.

AGE 828: Groundwater Development - 3 units

Well and well field design, testing, construction, operation and maintenance. Infiltration galleries and sand storage dams. Pump selection and design.

AGE 830: Dams - 3 units

Introduction to embankment dam design including principal section decants, seepage and its control and instrumentation. Construction and maintenance requirements. Principles of slope stability analysis. Classifications of instabilities.

AGE 832: Management, Operation and Maintenance - 3 units

Definition: Operations, Maintenance, rehabilitation, reliability; Organisation and staffing ; Main system and on-farm water management; Data collection, processing and analysis;

Monitoring and Evaluation. Renovate, modernize, rehabilitate.

AGE 841: Elements of Structural Analysis I - 3 units

Direct and shear stresses and strains, compound stress and strain. Shear and bending moment, stresses in beams. Trusses and plane frameworks, graphic statics, deflections of trusses. Deflection of beams, Cylinders and spheres, Circular plates. Thin walled sections

AGE 843: Engineering Properties of Materials of Construction - 3 units

Types of materials, steels, wood, concrete, rubber, plastics etc. used in construction. Materials will be treated in terms of manufacture or production, application, preservation and storage. Stress, strain and allowable stresses in various materials, material selection, concrete properties and mix-design.

AGE845: Farmstead Planning and Building Environment - 3 units

Concept of a modern farm set-up. The village environment and social arrangements. Types of structures needed in an efficient farm stead. The family house its layout and design. Structures for machinery storage and maintenance. The farm office and its functions. Thermodynamics of building-heat flow characteristics in buildings, heat exchange, ventilation, solar heat and control. Mechanical ventilation. Environmental parameters and their measurements.

AGE840: Buildings and Environments for Animal Production - 3 units

Environmental requirements for animals: heat exchange characteristics between animals and their surroundings, environmental factors and effects on reproduction and growth. Heat stress on animals in a tropical environment. Differential animal physical requirements and buildings to house them. Waste collection as part of housing design. Automatic feeding systems. Other specialized facilities.

AGE842: Elements of Structural Analysis II - 3 units

Long span structures, Statically indeterminate structures. Approximate analysis and stress analysis of statically indeterminate structures. Influence lines, plastic behavior of structures, deflections, Matrix and computer methods of structural analysis. Introduction to advanced structural mechanics.

AGE844: Building Construction And Surveying - 3 units

Survey instruments, horizontal distances measurements, leveling, measurements of horizontal and vertical angles field survey, setting batter boards, soil investigation, design of simple foundation and footings walls, roofs, structural design and simple frame work, selection of building materials, calculation of quantities, introduction to cmp. Design of storage buildings, storage inspection methods and quality control and losses. Packaging, etc.

AGE846: Buildings and Environments for Crop Production - 3 units

Green houses, glass houses and related structures- Construction, layout and needed controls. Plant growth characteristics and relation to the environment.

AGE848: Public Health Engineering - 3 units

The role of the engineer in the control of the environment; considerations of the total environment (the Eco-system). Communicable and non-communicable diseases, epidemiology and vital statistics. Role and control of insects and rodents in disease transmission. Water supply and waste

water problems; fundamentals of design of water and wastewater treatment facilities. Solid waste (refuse) handling and disposal. Air pollution and control.

AGE 899: Research Projects - 6 units per semester

Independent research on a selected topic or project investigation, chosen in consultation with the student's supervisor. It is intended to develop the student's supervisor. It is intended to develop the student's investigative and creative abilities, and solve problems of interest and benefit to the society and enhance technological development. A thesis will be submitted on completion.

LIST OF ACADEMIC STAFF

S/N	NAME	QUALIFICATION/SPECIALIZATION	RANK
1.	Prof. S. I. Manuwa	B.Sc.; M.Sc. (Ibadan); Ph.D. (Akure) MNSE, COREN Regd. Farm Power and Machinery	Professor HOD
2.	Prof. O.C. Ademosun	B.Sc. (Ife), M.Sc., Ph.D. (Cranfield), COREN (Registered), FNSE, FNIAE Agricultural Machinery and Agricultural Systems.	Professor
3.	Prof. A. S. Ogunlowo	B.Sc. (Ife), M.Sc. (California), Ph.D. (Texas), COREN (Regd), FNSE, FNIAE. Machine Design & Testing, Alternative Energy, Material Handling & Processing.	Professor
4.	Prof. A. A. Olufayo	B.Sc. (Ibadan); M.Sc. (S.ton), Ph.D. (France); MNSE, COREN (Regd.) Soil and Water Conservation, Irrigation Water Management.	Professor
5.	Prof. L.A.S. Agbetoye	B.Tech; M.Eng. (Akure): Ph.D. (Cranfield): MNSE, COREN (Regd) Farm Power & Machinery.	Professor
6.	Prof. M.O. Alatise	B.Sc. (Ibadan), Dip. In Eng. Hydrology (England), M. Sc. (Ife), Ph.D.(Akure) MNSE, COREN (Regd) Water Resources, Soil and Water Conservation	Professor
7.	Prof. O. J. Olukunle	B.Tech.(Akure), M. Tech. (Akure), Ph.D. (Akure), MNSE COREN (Regd). Farm Power and Machinery.	Professor
8.	Prof. P.G. Oguntunde	B.Eng. (Akure), M.Eng., Ph.D. (Germany), MNSE, COREN (Regd) Soil & Water Engineering	Professor
9.	Dr. A.E. Ajayi	B.Eng. (Akure), M.Eng., Ph.D. (Germany), MNSE, COREN (Regd) Soil & Water Engineering	Reader
10.	Dr. J. T. Fasinmirin	B.Eng.; MEng. PhD.(Akure). MNSE Soil & Water Engineering	Reader
11.	Dr. C.O Akinbile	B.Eng. (Akure), M.Eng.(Ibadan) PhD (Akure). MNSE, COREN (Regd) Soil & Water Engineering	Reader
12.	Dr. F. R. Falayi	B.Eng. (Akure), M.Eng.(Ibadan) PhD (Akure). MNSE, COREN (Regd) Farm Structures	Reader
13.	Dr. A.P. Olalusi	B.Eng.; M.Eng. PhD (Akure). Processing & Storage	Reader
14.	Dr. A.S. Oyerinde	B.Eng.; M.Eng. PhD (Akure). Processing & Storage	Senior Lecturer
15.	Dr O.O. Olubanjo	B.Eng.; M.Eng.PhD (Akure). Soil & Water Engineering	Senior Lecturer
16	Dr. O.O. Olanrewaju	B.Eng.; M.Eng. PhD (Witwaterstrand) Soil & Water Engineering	Lecturer I

9.2.2 DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING (CVE)

1. PROGRAMMES OFFERED

- (a) PGD, Civil Engineering
- (b) Master of Engineering (M ENG)
- (c) Doctor of Philosophy (Ph.D)

2. AVAILABLE OPTIONS/SPECIALIZATION

(a) PGD, General Civil Engineering

(b) Master of Engineering (M. Eng.):

- i) Structural Engineering
 - ii) Transportation Engineering
 - iii) Water Resources and Environmental Engineering
 - iv) Geotechnical Engineering
 - v) Construction Engineering
- (c) Doctor of Philosophy (Ph.D) in
 - i) Structural Engineering
 - ii) Transportation Engineering
 - iii) Water Resources and Environmental Engineering
 - iv) Geotechnical Engineering
 - v) Construction Engineering

3. PHILOSOPHY AND OBJECTIVES

(a) PGD, Civil Engineering

To provide an opportunity for advanced professional education and training in Civil and Environmental Engineering for:

- (i) Those who wish to upgrade their technical knowledge in the profession without necessarily seeking advanced research-oriented degree,
- (ii) Those who wish to make up for the deficiencies in their academic background to satisfy the requirement for the practice of engineering, and
- (iii) Those who wish to bridge their academic career from the practical oriented higher national diploma course to the more theoretical, research-based studies in the university, and subsequently pursue higher degree course.

The programme is designed in such a way that those who successfully complete it can be easily pass their examinations for professional registration in Nigeria. Those who complete the course with a minimum of 3.50 grade point average and requisite qualifications as stipulated by senate can also proceed to higher degrees.

(b) Master of Engineering (M Eng) and Doctor of Philosophy (PhD)

Civil and Environmental Engineering deals with the planning, design, analysis, construction, operation and maintenance of the physical systems that form multi-purpose, environmental, transportation, and hydraulic installation, as well as structure –buildings, bridges, etc. It involves urban planning, management of water and air resources, control of water, air pollution and solid wastes, and the engineering aspect of environmental health. The field is so wide that the work of civil and environmental engineers touches practically every aspect of human living. There is therefore the need to

continue to train in the several specialties of the profession, those graduates who have the motivation and ability to undertake programmes of advance courses and research.

The programme is designed with the following objectives;

- (i) To provide the student an opportunity to develop his/her special area of interest to realize the full extent of his/her capabilities
- (ii) To enable the student learn the fundamental concepts of their special field of civil and environmental engineering that will enable him/her to achieve high degree of professional competence.
- (iii) To teach advanced courses with emphasis on the treatment of practical engineering problems, and problem solving techniques.
- (iv) To develop and apply the student's intellectual qualities, technical ability and critical judgment expected in the engineering profession.
- (v) To attract practicing engineers who wish to update themselves on the latest developments in their fields of specialization,
- (vi) To conduct research relevant to the technologist development of the country and contribute to technical knowledge

4. ADMISSION REQUIREMENTS

(a) PGD

Candidate seeking admission to the programme must have any of the following:

- (i) B.Sc., B.Eng, or B.Tech. degree in Civil Engineering.
- (ii) B.Sc. in Building with a minimum of second class (lower)
- (iii) B.Sc. or B.Eng. In water Resources Engineering with at least a third class (Hons) degree.
- (iv) HND in Civil Engineering with at least lower credit
- (v) HND in Water Resources Engineering with at least lower credit

(b) M. Eng.

In addition to satisfying the general University regulations in admission, candidates eligible for admission shall normally:

- i) Hold Bachelors of Engineering (B. Eng.) with at least 2nd Class Honours Degree in Civil and Environmental Engineering of the Federal University of Technology, Akure or any other recognized universities that runs NUC and COREN-Accredited Civil Engineering programmes,
- ii) Candidates with PGD in Civil Engineering with at least Upper Credit may be eligible,
- iii) Other qualification in closely related disciplines such as Building Technology, Construction etc., with a good technical underpinning, which can be considered equivalent to the above, may be accepted for admission.

(c) Ph. D

Candidate for the Ph. D programme should normally have obtained:

- (i) M. Eng. Degree (Civil and Environmental Engineering) of the Federal University of Technology, Akure or from any other recognized universities that runs NUC and COREN-Accredited Civil Engineering programmes, with an overall grade of B.
- (ii) Master's degree in a close related discipline may also be considered with the provision of additional course work in meeting the student's approved research objectives in his area of specialization

5. DURATION OF PROGRAMME

(a) PGD, Civil and Environmental Engineering:

The programme is a minimum of four (4) semesters and a maximum of six (6) semesters of course work and project

(b) M. Eng.

The M. Eng programme consisting of course work and research will normally last a minimum period of 18-24 months on a full-time basis.

(c) Ph.D:

The Ph.D programme is a research study lasting for a minimum period of 36 – 48 months full-time or 48 – 72 months part-time beyond a Master's degree.

6. REQUIREMENTS FOR GRADUATION

(a) PGD, Civil and Environmental Engineering:

Candidate must complete a minimum of 67 units comprising 61 units of course and 6 units of independent project. The project will be conducted under the supervision of a senior academic staff, and culminate in a report that will be examined and approved by a panel of examiners.

(b) M. Eng.

For the Master's degree, students must complete successfully minimum 36 units of courses including at least 12 units assigned to their research projects. A student must demonstrate, in the research project, familiarity with the tools of research and scholarship in his selected area of specialization in Civil and Environmental Engineering, ability to work independently as a research scholar and present effectively the results of his investigation.

(c) Ph.D:

The PhD degree is awarded chiefly on the recognition of the candidate's high attainments and scholastic ability in his specialization. This is demonstrated by a continuous independent research work successfully completed under the general supervision of selected senior academic staff. The Ph.D thesis emanating from the research project is expected to demonstrate originality and power of independent investigation, creativity thought and work. The results of the research must form a contribution to knowledge.

7. COURSE OUTLINE

(a) PGD - FIRST YEAR

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 700	Research methods in Engineering.	1	1	0	1
CVE 709	Engineering Mathematics	3	2	0	3
CVE 711	Engineer-in-Society	2	1	0	2
CVE 713	Structural Analysis I	2	1	3	3
CVE 715	Soil Mechanics	2	0	3	3
CVE 717	Fluid Mechanics	2	0	3	3
CVE 719	Civil Engineering Material	1	0	3	2
TOTAL		9	5	10	17

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 706	Engineering Mathematics II	1	1	0	2
CVE 708	Technical Report Writing	1	1	0	2
CVE 710	Structural Analysis II	2	1	0	3
CVE 712	Geotechnical Engineering I	2	0	3	3
CVE 714	Hydrology	1	1	0	2
CVE 716	Civil Engineering Practice	2	1	0	3
CVE 718	Transportation Engineering I	1	1	3	3
TOTAL		10	6	6	18

SECOND YEAR

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 721	Statistical Methods	1	1	0	2
CVE 723	Numerical Method & Computer Prog.	1	1	3	3
CVE 725	Design of Reinforced Concrete Structures	2	0	3	3
CVE 727	Hydraulic Engineering	2	1	0	3
CVE 729	Transportation Engineering II	2	1	0	3
CVE 731	Environmental Engineering	1	3	3	3
TOTAL		9	7	9	17

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 720	Construction Management	2	0	0	2
CVE 722	Law, Management & Entrepreneurship	1	1	0	2
CVE 724	Geotechnical Engineering II	2	0	3	3
CVE 726	Design of Structures in Steel and Timber	1	1	0	2
CVE 728	Water Resources Engineering	1	1	0	2
	TOTAL	7	3	3	11

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 799	PGD Research Project	0	0	18	6

(b) M.ENG

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 801	Analytical Method in Engineering	3	0	0	3
CVE 803	Engineering Project Planning & Mgt.	3	0	0	3
CVE 821	Advanced Soils Mechanic	3	0	0	3
	Specialty Course				9
	TOTAL	9	0	3	18

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
CVE 802	Applied Statistics for Engineers	3	0	0	3
CVE 806	Civil Engineering Systems & Project Mgt.	3	0	0	3
	Specialty Course – 3 Nos	0	0	0	9
	Total				15

THIRD SEMESTER (1st Semester of 2nd Session)

Course Code	Course Title	L	T	P	Units
CVE 899	Master's Thesis Research Project	0	0	0	12

Specialty courses will be selected on the basis of availability of Lecturer, but with full consideration of the research interests of the students.

LIST OF SPECIALTY COURSES

(i) Structural Engineering Course

Course Code	Course Title	L	T	P	Units
CVE811	Advanced Structural Analysis	3	0	0	3
CVE812	Structural Dynamics	3	0	0	3
CVE813	Design of Steel Structures	2	3	0	3
CVE814	Theory of Plates and Shells	3	0	0	3
CVE815	Reinforced and Prestressed Concrete	2	3	0	3
CVE816	Theory of Elasticity	3	0	0	3
	TOTAL				18

(ii) Geotechnical Engineering Course

Course Code	Course Title	L	T	P	Units
CVE821	Advanced Soils Mechanic	3	0	0	3
CVE822	Advanced Foundation Engineering	3	0	0	3
CVE825	Dams and Water Retaining Structures	2	0	3	3
CVE826	Design of Earth and Rock Dams	2	0	3	3
CVE828	Soils Dynamics	3	0	0	3
CVE866	Tropical Soils of Nigeria in Engg Practice	3	0	0	3
	TOTAL				18

(iii) Transportation Engineering Course

Course Code	Course Title	L	T	P	Units
CVE831	Pavement Design and Stabilization	3	0	0	3
CVE832	Transportation Planning	3	0	0	3
CVE833	Advanced Highway Engineering	2	0	3	3
CVE834	Transportation Engineering	3	0	0	3
CVE835	Traffic Analysis and Design	2	0	3	3
CVE836	Highway Materials and Construction	2	0	3	3
	TOTAL				18

(iv) Water Resources and Environmental Engineering

Course

Course Code	Course Title	L	T	P	Units
CVE841	Advanced Hydrology	2	0	3	3
CVE842	Water Resources System and Management	3	0	-	3
CVE843	Advanced Hydraulic	3	0	-	3
CVE844	Water Resources Engineering	2	0	3	3
CVE845	Ground Water Engineering	3	0	-	3
CVE846	Stream Pollution and Water Quality	3	0	-	3
CVE848	Statistical Hydrology	2	0	3	3
CVE851	Water Supply and Sewage	2	0	3	3
CVE852	Design of Water & Waste Treatment Facilities	2	0	3	3
CVE853	Solid Wastes Engineering	2	0	3	3
CVE856	Environmental and Public Health Engineering	2	0	3	3
	TOTAL				33

(v) Construction Engineering Course

Course Code	Course Title	L	T	P	Units
CVE861	Construction Materials and Method	3	0	0	3
CVE863	Feasibility Studies, Design and Optimization of Construction Method	3	0	0	3
CVE864	Construction Engineering	3	0	0	3
CVE865	Construction Management	3	0	0	3
CVE867	Civil Design and Architecture	3	0	0	3
CVE868	Computer Techniques to Civil Engineering Problem	3	0	0	3
CVE876	Urban Development and Public Works Eng.	2	0	3	3
	TOTAL				21

THIRD SEMESTER

RESEARCH

Course Code	Course Title	L	T	P	Units
CVE899	Master's Thesis Project (for M. Eng)	-	-	-	12

(c) Ph.D

Course Code	Course Title	L	T	P	Units
CVE999	Doctoral Research Project (for Ph.D)	-	-	-	12

8. COURSE SYNOPSIS

A. PGD

CVE 700: Research Methods in Engineering (2, 1, -) 3 Units

Development of skills to undertake a comprehensive literature review and research project plans. Introduction to the general principles, methodologies and practices of data collection (both qualitative and quantitative) and analysis in qualitative research, analytics, content analysis, design aspects and research ethics. Data analysis tools will be covered as well as understanding the validity and reliability of data. Communicating scientific findings including writing academic publications and presentations.

CVE 709: Engineering Mathematics I (2, 1, -) 3 Units

Review of matrix operation including inversion, Eigen values, Eigen vector and Canonical transformations and application. Three dimensional vector representation, vector calculus, gradient, divergence and curl line, surface and volume integral, Laplacian operation. Green's, Stokes and Divergence theorems and applications. Ordinary and partial differential equation, special functions and integral, problem formulation, simple method of solution.

CVE 711: Engineer-In-Society (1, 1, -) 2 Units

Philosophy of science, History of engineering and technology. Safety in engineering and introduction to risk analysis. The role of engineers in nation building. Invited Lecturer from Professionals. Technology in society- growth and effect. The role and responsibilities of the engineer in society – education and engineers. Professional bodies and engineering societies – aims and objectives, structure and functions.

CVE 713: Structural Analysis (1, 2-3) 3 Units

Review of statical/kinematic indeterminacy. Displacement in structure: Virtual work method, Double integration, Macaulay's singularity function, Conjugate beam method, Moment- Area method. Influence lines for determinate and redundant structures. Analysis of structure: Method of Consistent deformations, Least work, Slope-deflection, and Moment distribution.

CVE 715: Soil Mechanics (2, -, 3) 3 Units

Mineralogy of soils, soil structure, origin of soils – rocks and mineral. Formation of soils, and soil deposits, soil properties. Soil and water relationship- void ratio, porosity, specific gravity and other factors. Soil Classification; Atterberg limits, particle size distribution. Flow of water in soils; seepage (permeability, flow net), permeability, and ground water flow. Compaction and soil stabilization. Site investigation, and methods of

subsurface exploration: boring and sampling tools/equipment, disturbed/undisturbed sampling, SPT, Dutch cone, vane and plate load tests, report writing, Laboratory tests, Soil survey and soil map study.

CVE 717: Fluid Mechanics (1, 1, 3) 3 Units

Fluid properties, static and buoyancy and stability of floating and submerged bodies. Fluid flow concepts and basic equation. Dimensional analysis, dynamic similitude. Flow of real fluids: viscous effects, resistance, compressible flows, velocity potential, Bernoulli equation; streamlines and flow nets. Application of fluid mechanics; fluid measurement; turbo machinery, steel closed – conduct flows, steady flow in open channels. Unsteady flows.

CVE 719: Civil Engineering Materials (1, -, 3) 3 Units

Description of the various materials used in Civil Engineering construction and determination of their properties. Concrete technology – types of cement, sand, aggregate and concrete mix design. Steel technology- production and fabrication, steel properties, corrosion and its prevention. Timber technology – type of wood properties and defects, wood preservation and fire protection. Other major materials such as asphalt, tar and rubber plastics, glass, lime and soils, Structure of the construction industry, construction, planning, administration, earthworks and earth moving construction equipment. Total quality management in construction. Application of operation research techniques in construction work.

CVE 706: Engineering Mathematics II (1, 1, -) 2 Units:
Complex Variable Function, deviation, language series, Taylor series, Cauchy theorem, Cauchy formula, Cauchy integrals. Analytic functions, singular points, Residual problems, Conformal problems and mapping. Special functions: Gamma, Delta, Beta and error functions. Fourier integral, Fourier transform for solving partial differential equations.

CVE 708: Technical Report Writing (1, 1, -) 2 Units

Principle of communication. Preparation and writing of technical reports. Oral presentation. Use of visual aids and other communication equipment in technical and research presentations.

CVE 710: Structural Analysis II (2, 1,-) 3 Units

Matrix method of structural analysis: Flexibility and stiffness methods. Plastic analysis of structures. Finite difference and finite element techniques. Analysis of plates and thin shells. Introduction to structural dynamics.

CVE 712: Foundation Engineering (2, -, 3) 3 Units

Stresses in soils: Total and effective stress, pore pressure. Moduli of Elasticity, Poisson's ratio. Introduction to stress distribution in layered system from Boussinesq's theory, Westergaard theory. Earth retaining structure; Earth pressure (active, passive and at-rest pressure), earth pressure coefficients, Computation of earth pressure using the Rankine

and the Columb wedge theories, and Culman's method. Earth pressure on retaining walls. Types and analysis of retaining walls. The use of bracings as lateral support in open cuts. Anchored bulkheads. Free earth support method of analysis. Bearing capacity: Ultimate, safe and allowed bearing capacities. Bearing capacity factor. Case of shallow and deep foundations. Factor of safety, shape effect, footing under eccentric and inclined loads. Foundation; Type and choice of foundation and piles. Use and general characteristics of piles, piles and sand piles in clay, negative skin friction. Bearing capacity of pile groups. Eccentric vertical loads dynamic pile driving formulas and efficiency of pile groups. Foundation subjected to dynamic forces.

CVE 714: Hydrology (1, 1, -) 2 Units

Hydrology cycle, History of hydrology, scope and application of hydrology, climatic measurement, precipitation and precipitation analysis, Analysis of hydrologic data including statistical inferences, infiltration, Evaporation and Evapotranspiration, Runoff and hydrograph analysis. Stream and reservoir routing, Ground water exploration and well hydraulics, sediment transport. Design criteria for water related projects.

CVE 716: Civil Engineering Practice: (2, 1, -) 3 Units

The engineering industry, management techniques, Project planning and implementation. Elements of business and industrial law as they relate to civil engineering practice. Case studies. Civil Engineering as a profession; function, training and responsibilities. Requirement for registration with professional bodies, roles and responsibilities of parties in Civil Engineering projects. Stages of engineering projects execution including conception, feasibility studies, detailed design, preparation of Civil Engineering quantities, BEME, type of contract, preparation of contract of documents, tendering procedures, evaluation and award, Law of contracts, Arbitration Law.

**CVE 781: Transportation Engineering I (1, 1, 3)
3 Units**

Introduction to different models of transportation: Highways, Railways, Air transport and Airports, Water transport, dock and harbours, pipelines, conveyor belts. Traffic flow theory, traffic management and control, Road safety/accident analysis, Highway lighting.

CVE 721: Statistical Methods (1, 1, -) 2 Units

Descriptive Statistics: Central tendencies and dispersion. Elementary probability theory, conditional probability, Baye's theorem. Probability distributions and applications. Elementary theories of sampling and estimation. Tests of hypothesis and significance. Curve fitting, Linear and Multiple regression analysis; Linear correlation, analysis of variance, Time series analysis, Statistical quality control mean, standard deviation, range, number of defects etc., sampling techniques, average sampling number, stochastic processes.

CVE 723 Numerical Method & Computer Programming (1, 1, 3) 3 Units

Gaussian elimination, Gauss-Seidel methods and Newton-Raphson Heron methods of solving linear equation. Forward and backward difference tables, central difference formula, Finite difference Solution to partial differential equations. Solutions of ordinary differential equation (1st and 2nd order) using Runge-Kutta method. Flow charting, Algorithms, inputs and output, Basin, Fortran and modern Languages. Computer software analysis, Highway/Transportation, geotechnical, Hydraulics/Hydrology problems and construction management. ICT.

CVE 725: Design of Reinforced Concrete Structures (2, -, 3) 3 Units

Process of structural design. The role of properties of engineering materials, especially steel and concrete, in structural design. Building regulation, standards and codes of practice. Elastic design, load factor, and the limit state design philosophy. Balanced design, over-reinforced and under-reinforced concrete elements to BS8110: slabs, beams, columns, foundation. Design of multi-storey buildings.

CVE 727: Hydraulic Engineering (2, 1, -0) 3 Units

Types of flows in open channel and closed conduits, turbulent flows. Water waves and wave characteristics. Steady and unsteady, uniform and non-uniform flow in open channel, Natural streams back water curve. Hydraulic jumps and energy dissipation. Hydraulic similitude and application to hydraulic models. Water hammer, water turbines and centrifugal pumps.

CVE 729: Transportation Engineering II (2, 1, -) 3Units

Route location and design, Geometric design of highways, pavement design and construction (flexible and rigid), Highway materials, Drainages and earthworks.

CVE 731: Environmental Engineering (1, 1, 3) 3Units

Examination of Water and Wastewater. Collection, treatment, protection and distribution (including design of facilities) of water, municipal and industrial Wastewaters. Fundamental of solid Waste Management, Air Pollution Control, Stream Pollution.

CVE 720: Construction Management (2, -, -) 2 Units

Introduction to management and project management. Planning, design, development control and evaluation of civil engineering projects. Project budget, work plan, scheduling and tracking, contract system. Project organization, economic analysis, Cultural and human resources issues in project development. Personnel management, manpower planning and development, operation and maintenance of built project and construction phase of civil engineering projects. Total quality management. Application of operation research techniques in construction work. Network analysis and chart labour laws, site safety, and law of Torts

CVE 722: Law, Management and Entrepreneurship (1, 1, -) 3 Units

Principle of Management, Industrial group and organizational behavior, Motivation, Industrial Law, legislation of wages, trademarks and patents, Laws of contract and sales of goods. Liability for industrial injuries, industrial relations, trade unions, employer associations, wages bargaining and the role of the state. Relevant topics on entrepreneurship designed by the National Universities commission for Nigerian Universities.

CVE 724: Geotechnical Engineering (2, -, 3) 3 Units

Consolidation and settlement; One-dimensional consolidation. The oedometer test. Primary and secondary consolidation. Immediate and consolidation settlement. Analysis of total and time rate of settlement. Settlement of spread and pilled foundations. Shear strength of soils: General strength consideration. State of stress at a point and Mohr stress circle. Mohr Coulomb theory of failure. Shear Tests: Vane shear test, direct shear test, triaxial test. Shear strength of saturated clays, shear strength of compacted unsaturated clays, sensitivity of soil, residual strength parameter. Slope stability: Types and mechanics of slope failures. Theoretical and graphical solution of slope stability problems. Short term and long term slope stability problems. Unsupported vertical cuts. Effect of tension cracks on slope stability.

CVE 726: Design of structures in Steel and Timber (1, 1, -) 3 Units

Review of design of steel members in tension compression and bending. Design of structural steel connection. Design of beams, compound beams, columns, compound columns, Industrial columns and columns foundations. Analysis of lattice order: Trusses, portal frames, General frames, masts, tower etc. Review of design of Timber members in tension, compression and bending. Design of Timber connection, beams, trusses, columns, towers masts etc. Types and properties of Timber species in Nigeria.

CVE 728: Water Resources Engineering (1, 1, -) 2 Units

Urban hydrology, Drainage and Land reclamation, Dam and reservoirs, spillways and stilling basins, Design of irrigation Canals, Hydropower, River Basin Planning, Water Supply Engineering.

CVE 799: PGD Research Project (3 Unit per Semester) 6 Units

A guided/ supervised individual investigation of a civil engineering problem in the student's chosen topic, under staff direction. A project report on the topic demonstrating creative engineering ability and utility, must be written and will be examined and approved by a panel of examiners.

B. M. ENG**CVE 801: Analytical Method in Engineering (3, -, 3 Units)**

Development of mathematical methods commonly found in the literature of applied physics and engineering with

emphasis on techniques used in system engineering, Matrix analysis. Solution of ordinary and partial differential equation, and application, Laplace transform and its properties, Fourier series, Bassel functions, Harmonic analysis, Complex function and conformal mapping. Operational calculation, Numerical methods.

CVE 802: Applied Statistics for Engineer (3, -) 3 Units
Concept of randomness and probability. Frequency distributions, measures of central tendency and dispersion, measures of association, correlation and regression, expectation, derived distribution and sampling. Theories of estimation and significance testing. Regression analysis. Probability models for physical situations. Principles and practice of experimental design, Analysis of variance, factorial designs.

CVE 803: Engineering Project Planning and Management (3, -) 3 Units
Planning, control and evaluation of large scale projects. Scheduling, contract system technology, project productivity. Human factors, including technical, political, economic, social and environment factors. Simulation of the planning, design and construction processes. Network based systems for planning, time and cost of projects. Organization structures for communication and control. Economic of scale in building design and operations, Contract and documents.

CVE 806: Civil Engineering System Analysis and Project Planning (3, -) 3 Units
Analysis of Civil Engineering projects from a system concept. Methodology of a comprehensive and integrated approach to solving complex problems. Study of various mathematical programming techniques for optimization and simulation and application to problems of transportation, structure, construction, water resources management, environmental system and urban development. Management concepts applied to civil engineering projects realization. Project organization and related technical, political, economic, social and environmental factors. Engineering economic analysis of projects.

CVE 811: Advanced Structural Analysis (3, -) 3 Units
Virtual work theorems for forces and displacements. Torsion and lateral buckling. Matrix methods of structural analysis. Flexibility method; Stiffness method; the direct stiffness method. Influence lines for redundant structures: Continuous beams, Trusses, Rigid frames, Arches, Analysis of beams-columns on elastic foundation. Building frames subjected to lateral forces. Analysis of continuous arch frames. Recent development in theory of structures. Application of structural analysis computer software packages.

CVE 812: Structural Dynamics (3, -) 3 Units
Analysis of system with one and several degrees of freedom. Problems involving non-linear force-displacement relation

and damping. Determination of natural frequencies of structures. Vibration of flexural members. Numerical methods of analysis. Design application and computer solutions.

CVE 813: Design of Steel Structures (2, 3) 3 Units
Use of, and technical background to codes, standards and building regulations. Review of design of structural elements in steel, including steel girders. Design requirement for utility, and for multi- storey buildings. Design requirement for bridges, tanks, reservoirs, pressure vessels, and other heavy structures. Composite construction. Application of structural design computer software packages.

CVE 814: Theory of Plates and Shells (3, -) 3 Units
Methods of calculating stresses and deformation in plates and shells used under various conditions, membrane and flexural analysis of shells of revolution within the design of domes, container and pressure vessels. Stability analysis of shells structure. Influence of initial stresses and large deformations. Thermal effect in shell structures. Analysis of composite shell structures.

CVE 815: Reinforced and Prestressed Concrete Design (2, -3) 3 Units
Fundamental of reinforced concrete theory, design and analysis. Analysis and design of beams, slabs, and columns. Preliminary designs and the role of appropriate method. Shear distribution in multi-storey building frames subjected to lateral forces. Application of structural design computer software packages. Principles of prestressed concrete, prestressing systems, end anchorage and loss of prestress. Analysis and design of sections for flexure, shear, bond, bearing and deflection. Continuous beams, slabs, tension and compression members. Circular prestressing, Current building codes, specifications and practices.

CVE 816: Theory of Elasticity (3, -) 3 Units
Notion of stress and strain. Basic equation of linear theory of elastic media. Stress functions and displacement potentials. Application to specific classes of problem, such as plane strain, contact stresses, exisymmetric problems. Stress concentration singular states of stress. Dislocation and residual stresses. Wave motion in elastic media.

CVE 821: Advanced Soils Mechanics (2, - 3) 3 Units
Summary of common clay minerals, clay mineralogy and clay water system, Rate of consolidation, Accelerating consolidation with sand drains and surcharge, Shear strength of saturated clays, Stress paths, Shear strength of compacted unsaturated clays, undrained vane shear test, Review of slope stability of non-circular slip surfaces, Foundation subjected to dynamic forces, maintenance; Avoiding faults and failures in construction materials and foundations, Presentation of term paper on a given topic on soil mechanics and foundation engineering

CVE 822: Advanced Foundation Engineering (2, -3) 3 Units

Foundation designs settlement calculations, consolidation. Slope stability. Foundation on elastic supports. Land drainage in relation to foundations. Settlement of foundation in cohesive and cohesionless soils. Pile foundations—rigid and flexible sheet piling cofferdams, hydraulic structures.

generation, distribution and assignment. Application of multiple regression, linear programming recursive models and other techniques to land use and transportation planning. Transportation networks. Coordination of city planning and transportation engineering. Transportation administration and finance.

CVE 825: Dams and Water Retaining Structures (2, -3) 3 Units

Selection of the type of dams, Design of earth dams, Design of rockfill dams, Design of concrete dams, Site visit to a dam site, Term paper and class seminar on dams.

Each student is expected to type and hand in one of the following and deliver it at a class seminar: Overtopped rockfill, cofferdams, cofferdam selection, Foundation grouting, Residual soils, Compressibility of rockfill, Shear strength of rockfill, Slurry trench and similar processes, Caissons, Planning and environmental studies, Hydrological studies of dam sites, Geomembranes, geotextiles, geogrids, specialty geosynthetic for erosion control of dams, Environmental impact assessment of dams.

CVE 833: Advanced Highway Engineering (2, -3) 3 Units

Principle of highway design, subgrade soils, drainages, construction, and maintenance of pavement and road surfaces. Design of rigid and flexible pavements and culverts for highway and airports. Geometric highways designs – problems in highway, sheet and intersection capacity, location and design, rural and urban, at grade intersection design, grade separations and interchange design.

CVE 826: Design of Earth And Rock Dams (2, - 3) 3 Units

Design of earth dams, embankment and sheet pile structures. Engineering properties and behavior of rock masses; stability of rock masses. Methods of analysis and design of earth – retaining and water retaining structures. Seepages analysis, stability analysis. Foundation explorations. Influence of seepage on embankment stability. Construction control and field measurement of pore pressure and earth movements. Reservoir safety and long-term service performance of dams. Hydraulic design of spillways, reservoir and related structures. Project on real life dam designs are carried out by the students.

CVE 834: Transportation Engineering (2, -3) 3 Units

In depth study of the functional and geometric design of highway and airports. Engineering principles of movement for all types of transportation. Technological characteristics of railways, highways, waterways, and pipelines. Engineering performance criteria. Operational control. Cost of service. Planning for transportation use. Economic analysis of alternate designs; system routs and component selection.

CVE 835: Traffic Analysis and Design (2, - 3) 3 Units

Scientific approach to the study of traffic phenomena with emphasis on applications. Deterministic and stochastic models of traffic flow; intersection control, computer stimulator of traffic problems. Causes and analysis of accident and congestion. Traffic surveys. Planning and design of physical facilities for controlling highway traffic. Parking studies, Techniques for improving traffic operations.

CVE 836: Highways Material And Construction (2, - 3) 3 Units

Soil in highways. Soil stabilization. Aggregates, Theoretical and practical design of concrete mixtures and use in highways and associated construction works. Bituminous materials and mixture sources, manufacture processing, types, constituents, development and laboratory tests and controls, chemical behavior, specification and uses in highway construction and maintenance. General highway materials. Construction of rigid and flexible pavements. Design, construction and maintenance of asphaltic concrete, Mix designs.

CVE 841: Advanced Hydrology (3, - 3) 3 Units

Interrelationship of hydrologic cycle components – precipitation, interception, infiltration, evapotranspiration, groundwater flow and surface runoff. Analysis of precipitation and stream flow data. Hydrograph analysis and use. Flood studies. Runoff and basin response models. Hydraulic of groundwater and wells. Evapotranspiration and infiltration models. Use of hydrologic techniques in water resources studies, data collection and analysis. Design of hydrometric networks, engineering applications.

CVE 828: Soil Dynamics (3, - , 3) 3 Units

Review of basic vibration theories as applied to soil machine. Elastic wave propagation in soils. Elements in seismic investigation. Dynamic densification of soil. Strength of soils under dynamic loading. Analysis of foundation in vibration. Blast loading on soils.

CVE 831: Pavement Design and Stabilization (2, - , 3) 3 Units

Highways and airfield soil classification and testing. Rigid and flexible pavement design, stresses and strains in flexible and rigid pavements. Properties of pavement components. Mechanism of soil stabilization, compaction, use of additive (aggregates, cement, asphalt, chemicals), special techniques. Principle and techniques of soil stabilization for use in foundation material in highways and air fields.

CVE 832: Transportation Planning (3, -) 3 Units

Regional and metropolitan transport studies. Current techniques of transportation planning including the development and use of mathematical models for trip

CVE 842: Water Resources Systems and Management (3,-) 3 Units

Comprehensive planning of water resources. Use of advanced techniques for the design and analysis of complex, multipurpose water resources systems. Identification of the objectives of Design and translation of the objectives into design criteria. Evaluation of alternate designs and selection of the best design. Optimization and simulation techniques and their application to water resources systems. Modeling techniques. Analysis of multiple-purpose projects and comprehensive basin development. Principle of economic analysis of various types of water resources development.

CVE 843: Advanced Hydraulic (3, -, 3) 3 Units

Application of the principle of fluid mechanism to practical problems of flows in closed conducts, open channels and hydraulic structures. Study of laminar flow, turbulent flow and diffusion in conduits and open channels. Uniform and non-uniform, steady and unsteady flow in open channels – velocity formulas and backwater curves. Flow through transitions, obstructions and bends. Analysis of energy losses in conduits, transitions and various types of hydraulic structures. Application of the energy and momentum principles in predicting the flow for various boundary configurations. Computational methods. Flood routing, waves and surges.

CVE 844: Water Resources Engineering (2, -3) 3 Units

Utilization of the principle of hydraulic, hydrology and environmental engineering in problems of erosion and flood control, power and irrigation navigations water supply, and water quality control. Economics and water laws in river basin planning. Water resources planning. Multipurpose projects. Design of selected hydraulic structures.

CVE 845: Ground Water Engineering (3, - 3) 3 Units

Study of groundwater as a source of municipal, industrial and agricultural water supplies. Location, Occurrences and nature of groundwater flow. Analytical and numerical solution to flow equations. Groundwater modeling. Determination of aquifer and well characteristics. Well construction techniques. Well discharge and pumping tests analysis. Drainage problems. Artificial recharge. Salinity control. Conjunctive use. Optimal management of groundwater reservoir.

CVE 846: Stream Pollution and Water Quality (3, -) 3 Units

Introduction to the physical processes of mass transport in fluid due to diffusion, dispersion and convection. Mixing and dilution of pollutants discharge into natural water bodies. Mathematical modeling of water quality in stream and estuaries. Development of basic equation describing the distribution of conservatives and non- conservative contaminant in stream and estuarine water. BOD, COD, and DO, dynamics in stream and river parameter estimation. Salinity intrusion in coastal waters. Application of systems analysis to water quality management.

CVE 848: Statistical Hydrology (2, - 3) 3 Units

Statistical method applied in hydrological data analysis. Theory and use of statistical distributions; log-normal, weibull and extreme value distribution. Time series analysis of hydrological data. Application of computer programmes and mathematical models to fits selected hydrological data.

CVE 851: Water Supply and Sewage (2, -3) 3 Units

Development of sources of water supply. Information analysis. Design of collection, transmission and distribution systems. Design of sewage collection works. Hydraulics of open channel and pipe flows. Water quality parameters and standard water quality criteria. Cost analysis of projects.

CVE 852: Design of Water and Wastewater Treatment Facilities (2, -3) 3 Units

Principle of water and wastewater treatment processes employed for domestic and industrial water supplies as well as for municipal and industrial wastes. Analysis and organization of various physical, chemical and biological processes involved in the treatment of waters and wastewater – aeration, coagulation, sedimentation, filtration and biological conversions. Functional study of plant loading in relation to degree of treatment desired; layout and hydraulic design of treatment process units. Mechanical and thermal energy requirement. Basis for design are presented, with methods for ultimate disposal, pollution control and reclamation.

CVE 853: Solid Waste Engineering (2, - 3) 3 Units

Detailed engineering and management consideration related to the design, evaluation, and operation of solid waste storage, collection and disposal systems. Solid wastes survey. Incinerators evaluation and design. Composting, Salvage systems, Special wastes. New method of collection and disposal. Legal, political and administrative consideration. Cost analysis of solid waste management.

CVE 856: Environment and Public Health Engineering(2, -3) 3 Units

Fundamental of air quality and air pollution. Effect of pollutant on Environment. Methods of control of environmental hazards. Occupational and industrial hygiene. Impact of engineering projects on environmental quality. Examination of man's environment with particular emphasis on water supply, waste management and community health. Engineering criteria for evaluating the adequacy of public health and environmental sanitation facilities. Sources of infection, modes of transmission, diseases vectors, elementary epidemiology, rural sanitation, housing, food control, refuse disposal and control of insect vectors of diseases. Engineering treatment of the salient feature of environmental protection laws.

CVE 861: Construction Material and Method (3, -) 3 Units

Materials of construction – soils, cement, concrete, steel and other metals, timber, fibers and composites materials,

bituminous materials. Static properties and use of material. Manufacture and performance characteristics and use of material. Method and equipment employed in processing the materials in high and heavy construction – Building, highways and their appearance

CVE 863: Feasibility Studies, Design and Optimization of Construction Methods (3, -) 3 Units

Study of the design process from the clients' requirement to the realization of the design on site including planning of design, creativity and innovation, the problem of analysis and evaluation of various optimization techniques. The application of computer to structural design and automatic detailing processes. The client, the consultant, evaluation of alternative lines of development, competitive cost estimate for design, construction and operation, translation of proposal into a detail brief, recommendation of types of contract after an investigation, supervision requirement during construction stage.

CVE 864: Construction Engineering (2, -3) 3 Units

Quantitative and analytical techniques applied to construction processes. Operation research techniques and application to construction system optimization. Design studies. Planning reports, feasibility studies. Factors affecting the selection and purchase of construction equipment. Application of engineering fundamental to performance/output of construction equipment. Principle of cost estimation for the construction industry.

CVE 865: Construction Management (3, -) 3 Units

Management of design and construction in built environment. Management of resources of construction, financial, equipment, human resources from project conception to commission. Construction and industrial law- contract procedure and administration. Tendering procedure, contract document, insurance, Bonds, Safety and other acts relating to construction operations. Site and office management, organization and control methods, case studies and preparation and presentation of reports on construction operations, and problems in building and heavy construction in Nigeria.

CVE 866: Tropical Soils of Nigeria in Engineering Practice (3, -) 3 Units

Review of geology of Nigeria; Geotechnical properties and behaviour of Nigerian soils including lateritic soils, black cotton soils, deep organic clay stratum, soft clay shale, and compacted Fadama soils; Earthworks and foundation on recently deposited organic soils; Permeability of compacted soils; Groundwater and erosion including groundwater levels and ground movement, hydraulic of soil erosion; Engineering and geological applications including, availability of fine aggregate in river, soils for low cost housing, black cotton soils in road pavement design, construction and performance, and bitumen stabilized soils in road pavement construction;

Flexible pavement design for tropical highways; Flexible pavement maintenance for tropical highways; Building material in hot and arid climate.

CVE 867: Civil Design and Architecture (3, -) 3 Units

Modern town planning and the historical tradition – objective in town planning (political, economic, sanitary) – Constraints in planning, (natural, technical, socio-economic etc.) – Concept in civil design, (shape, size, boundary, forces etc.) – The modern city prior to 1800 in the nineteenth century during the modern movement and the Garden city movement, urbanization, the model city: size, growth and change in the city as a whole, in its constituent parts.

CVE 868: Computer Techniques For Civil Engineering Problems (2, -3) 3 Units

Revision of computer programming, Design methods. Computerized design systems. Computer graphics. Application to Civil Engineering problems. Examination of a selected series of engineering programs and programming systems.

CVE 876: Urban Development and Public Works Engineering (2, -3) 3 Units

Engineering in urban development; relation of transportation, sanitary works, drainage and other utilities to urban development. Surveying and mapping requirement. Housing Building codes. Public works engineering. The civil engineers' role in public works field; municipal engineering and public works responsibilities in planning, financing design, construction, operation and maintenance of public facilities. Case studies, - Report and presentations'.

CVE 899: Master's Thesis Research Project (for M. Eng.) 12 Units

Independent research and investigation of a problem in Civil Engineering, leading to M. Eng. thesis. Work consists of a theoretical analysis which may in some cases, be combined with experimental verification. It must demonstrate creative ability, originality and utility worthy of publication in recognized engineering journals. The candidate will be required to take an oral examination on completion, covering the field of their thesis and related topics.

CVE 999: Doctoral Research Project (For Ph. D) 24 Units

Independent research and investigation of a problem in Civil Engineering, leading to Ph. D thesis. Work consists of a theoretical analysis which may in some cases, be combined with experimental verification. It must demonstrate creativity ability, originality and utility worthy of publication in recognized engineering journals. The candidate will be required to take an oral examination on completion, covering the field of their thesis and related topics.

LIST OF ACADEMIC STAFF

S/N	NAME	QUALIFICATION/SPECIALIZATION	RANK
1.	Arum C.	M.Sc (Kharkov), PhD (Moscow), MNSE, MEACE, COREN (Regd.); Structural Engineering	Professor HOD
2.	Afolayan J. O.	B. Eng, M. Eng, Ph.D (Zaria), MNSE, MSSRC, AMNYAS, AMASCE, COREN (Regd.); Structural Engineering	Professor
3.	Babatola J. O.	M. Sc (Gorki), PhD (Akure), MNSE, COREN (Regd.); Hydraulic & Environmental Engineering	Professor
4.	Owolabi A. O.	B.Sc (Zaria), MSc (Zaria), PhD (Akure), COREN (Regd.); Highway and Transportation Engineering	Professor
5.	Okoli C. S.	M. Sc. (Strathclyde), PhD(Akure), MNSE, MICE, COREN(Regd.); Hydraulic Engineering	Professor
6.	Ojuri O.O	B.Eng (Benin), M. Eng, Ph.D(Akure), MNSE, COREN (Regd.); Geotechnical Engineering	Reader
7.	Aiyewalehinmi E. O.	B.Sc.(Norway), PGD (Norway), MSc. (Ireland), PhD (Australia), EdD (Australia), Member, Norwegian Society of Engineers; Construction Engineering	Senior Lecturer
8.	Olanitori L. M.	M. Sc(Astrakhan), Ph.D (Akure) MNSE; COREN (Regd.) Structural Engineering	Senior Lecturer
9.	Aderinlewo O. O.	B.Sc (Ibadan), M.Eng (Akure), PhD(Delaware), MNSE, MASCE; COREN (Regd.); Transportation Engineering	Senior Lecturer
10.	Aderinola O. S.	B.Eng (Ife), M.Eng, Ph.D (Akure), MNSE, MASCE, COREN (Regd.); Highway and Transportation	Senior Lecturer
11.	Oyedepo, O. J.	B. Eng, M. Eng, Ph.D (Akure), MNSE, COREN (Regd.); Highway and Transportation Engineering	Senior Lecturer
12.	Adewumi J. R.	B. Eng (Bauchi), M. Eng (Akure), Ph.D (Wits) MNSE; COREN (Regd.); Water Resources and Environmental Engineering	Senior Lecturer
13.	Oluyemi Ayibioju B. D. (Mrs.)	B. Eng, M. Eng, Ph.D (Akure), MNSE, MASCE, MNICE, COREN (Regd.); Highway and Transportation Engineering, Soil and Foundation Engineering	Senior Lecturer
14.	Ikumapayi C. M (Mrs.)	B. Eng, M. Eng, Ph.D (Akure), MNSE; COREN (Regd.); Structural Engineering	Lecturer I
15.	Ojo O. M (Mrs.)	B.Sc., M.Sc. (Ibadan) MNSE, COREN (Regd.); Water Resources and Environmental Engineering	Lecturer I

9.2.3 DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)

1. PROGRAMMES OFFERED

- a) Postgraduate Diploma (PGD)
- b) Master of Engineering (M.Eng)
- c) Doctor of Philosophy (Ph.D)

and hopefully remain current in their capabilities in spite of the rapidly evolving nature of the areas concerned. Naturally products of this programme are well-suited also for the educational sector especially at the tertiary level.

2. AVAILABLE OPTIONS/ SPECIALIZATION

- i) Power Systems Engineering
- ii) Communication Engineering
- iii) Control Engineering

The courses are thus organized into a core set entailing the kernel elements of the program, and electives designated as advances in the specific area. The course contents included here are only relevant to the conditions prevailing at the time of preparation of this programme. The actual content will depend on the circumstances and the advances that are relevant to ensuring that the objectives of programme are met. The Phd program is a research-centered one, which will depend on the background and prior preparedness of the candidate. Candidates may be required to take as well as audit relevant courses in order to improve their capabilities especially in other disciplines. The choice of research area will depend on availability of supervisors and other equipment. Research will be conducted in topic that are relevant to the technological development of the country as well as contribute to technical knowledge in the fields of electrical and electronics engineering.

3. PHILOSOPHY & OBJECTIVES OF PROGRAMME

(a) Post-Graduate Diploma

To provide an opportunity for advance professional education and training in Electrical and Electronics Engineering for:

- i) those who wish to upgrade their technical knowledge in the profession without necessarily seeking advanced research-oriented degrees;
- ii) those who wish to make up for the deficiencies in their academic background to satisfy the requirements for the practice of electrical and electronics engineering; and
- iii) those who wish to bridge their academic career from the practical-oriented Higher National Diploma course to the more theoretical research-based Studies in the University.

The programme is designed to enable, amongst other, successful candidates attempt and pass relevant profession professional engineer in Nigeria. Those who complete the course with a minimum of 4.0 grade point average (Upper Credit) and requisite qualifications as stipulated by Senate can also process to higher degrees.

(b) Master of Engineering (M.ENG) and Doctor of Philosophy Programmes

Electrical and Electronics engineering are two disciplines that enable man in the 21st Century to maintain a life-style that was the substance of dreams over the ages. Its products have bred a plethora of possibilities that are frequently upgraded and changed at mind boggling rate. No nation aspiring to being part of the comity f nations can therefore do so without a virile capacity to use, update and develop most aspects of these disciplines. The postgraduate programmes are aimed at achieving these objectives.

The master of engineering programme is designed to address these very issues. It is designed to transform graduate engineers into specialists capable of coping with the extent challenges posed by the complex technological and management issues inherent in the development, operations and sustenance of the industrial, and government and private sectors of a developing economy.

The program is structured to upgrade the theoretical capability that will enable participants to become experts

4. ADMISSION REQUIREMENTS

(a) PGD

In addition to satisfying the minimum UME requirement for admission to engineering programmes in the university, a candidate may possess any or a combination of the following:

- i) A first degree with at least a 3rd class grade in Electrical and/or Electronics Engineering, and
- ii) HND with at least a Lower Credit pass in Electrical and/ or Electronics Engineering from a recognized Institution.

(b) M.ENG

To be qualified for admission into the M.Eng programme, candidates must satisfy appropriate requirements as stated below. A candidate who has:

- i) a bachelors degree in Electrical and Electronics Engineering with at least a second class lower division from either FUTA or any other recognized university that runs COREN-accredited electrical and electronics engineering programmes is qualified for entry; and
- ii) Candidates with PGD in electrical and electronics engineering, with at least CGPA of 4.0, may be eligible to do the M.Eng. Programme.

(c) PhD

To be qualified for admission into the PhD programme, candidates must satisfy appropriate requirements as stated below. A candidate who has:

- i) An M.Eng degree in Eletrical and Electronics Engineering with a minimum score of 60% from either FUTA or any other recognized university that runs COREN-accredited electrical and electronics engineering programmes; and

- ii) Obtained the qualifications tenable for admission into M.Eng programme in Electrical and Electronics Engineering Department of SEET, FUTA, is eligible to do the PhD programme.
- iv) A candidate, after carry out satisfactorily post seminar review, must submit the required number of copies of thesis for a viva; and pass satisfactorily the examination of the submitted thesis.

5. DURATION OF PROGRAMMES

(a) PGD

The programme shall be four (4) semesters (24months).

(b) M.Eng

The M.Eng programme consisting of course work and research will normally last a minimum period of 18 but not more than 24 months on full time basis.

(c) PhD

The PhD programme is a research study lasting for a minimum period of 36-48 months full time or 48-72 months part-time beyond a master's degree.

6. REQUIREMENTS FOR GRADUATION:

a. PGD

Each diploma student is required to successfully complete in four semesters, a minimum of 60 units of course works and 6 units of an independent project.

b. M.ENG

In order to receive the M.Eng degree, a candidate must successfully:

- i) Pass all courses selected from a buffet of course outlined in section 8.4;
- ii) Present and pass two seminars based on a 12 credit load supervised thesis;
- iii) Submit the required number of copies of the; and
- iv) Pass the oral examination of the submitted thesis. Where a student exhibits deficiency(ies) in any area of the such a student may be required to register for, and pass the appropriate undergraduate course(s) to make up for the deficiency(ies).

c. PhD

In order to receive the PhD degree, candidate must carry out an independent research work in his specialization under the general supervision of selected senior academic staff in the chosen field of research. The candidate must demonstrate high scholastic ability through the research work. The dissertation emanating from the research should exhibit originality and the result must form distinct contributions to knowledge. In carrying out this main requirement, a candidate must observe the following:

- i) A candidate must, in consultation with his supervisors, present a comprehensive research proposal and a proposal seminar in the department successfully within the first year of study;
- ii) As in c(i), a candidate must present a progress report and seminar in the department successfully;
- iii) On completion of the research work, the candidate must present an end -of- thesis seminar successfully in the department.

7. COURSE OUTLINES

(a) PGD - FIRST YEAR

FIRST SEMESTER

Course Code	Course Title	L	T	P	Unit
EEE 701	Engineering Mathematics I	2	1	0	3
EEE 705	Numerical Methods.	2	1	0	3
EEE 707	Statistical Methods	2	1	0	3
EEE 711	Circuit Theory	2	1	0	3
EEE 713	Elect/Elect Engineering Materials	2	1	0	3
EEE 715	EM Field & waves	2	1	0	3
EEE 717	Electrical Service Design	2	1	0	3
EEE 781	Laboratory Practical I	-	-	3	1
					22

SECOND SEMESTER

Course Code	Course Title	L	T	P	Unit
EEE 702	Engineering Mathematics II	2	1	0	3
EEE 720	Solid State Electronics	2	1	0	3
EEE 722	Electronics Devices & Systems	2	1	0	3
EEE 726	Digital Electronics	2	1	0	3
EEE 728	Elect/Elect Measurements & Instrumentation	2	1	0	3
EEE 758	Computer Programming.	2	1	0	3
EEE 770	Electrical Power Principles	2	1	0	3
EEE 782	Laboratory Practical II	-	-	3	1
					22

SECOND YEAR
FIRST SEMESTER

Course Code	Course Title	L	T	P	Unit
EEE 703	Reliability Engineering	2	1		3
EEE 709	Engineers in Society	2	-		2
EEE 741	Control Systems Engineering I	2	1		3
EEE 771	Power System Engineering.	2	1		3
EEE 751	Communication Principles	2	1		3
EEE 761	Electrical Machines	2	1		3
EEE 783	Laboratory Practical III	-	-	3	1
EEE 799	Project I	-	-	9	3
					21

SECOND SEMESTER

Course Code	Course Title	L	T	P	Unit
EEE 704	Technical Report Writing.	2	-		2
EEE 706	Engineering law, Management & Enter.	2	1		3
EEE 724	Power Electronics	2	1		3
EEE 734	Digital Signal Processing	2	1		3
EEE 742	Control System Engineering II.	2	1		3
	Elective	2	1		3
EEE 784	Laboratory Practical IV	-	-	3	1
EEE 799	Project II	-	-	9	3
					21

Electives

Course Code	Course Title	L	T	P	Unit
EEE 772	High Voltage & Switch Gear Engineering	2	1	-	3
EEE 762	Energy Systems	2	1	-	3
EEE 754	Data communication	2	1	-	3
EEE 756	Microwave Engineering	2	1	-	3
EEE 748	Communication Systems	2	1	-	3
EEE 729	Micro Computer Hardware and Software Technique	2	1		3
EEE 708	Engineering Economics	2	1		3

(b) M.ENG
(i) Control Engineering Option
FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 811	Engineering Mathematics	2	1	0	3
EEE 821	Advanced Analog and Digital Electronics	2	1	0	3
EEE 833	Digital Signal Processing	2	1	0	3
EEE 841	Classical Control Theory	2	1	0	3
EEE 853	Analog and Digital Communications Systems	2	1	0	3
	TOTAL				15

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 822	Embedded Systems	2	1	0	3
EEE 826	Data Acquisition Systems & Instrumentation	2	1	0	3
EEE 846	Nonlinear Control Systems	2	0	3	3
EEE 844	Control Theory and Industry	2	1	0	3
EEE 892	Seminar	0	0	0	1
	One (1) elective course	2	1	0	3
	TOTAL				16

Electives

Course Code	Course Title	L	T	P	Units
EEE 824	Power & Industrial Electronics	2	1	0	3
EEE 840	Computer Applications in System Engineering	2	0	3	3
EEE 842	Linear Multivariable and Optimal Control	2	1	0	3
EEE 828	Biomedical Instrumentation	2	1	0	3

EEE 831	Contemporary Computer Systems	2	1	0	3
EEE 832	Computer Networks: Concepts and Fundamental	2	1	0	3
EEE 834	Wireless Networks and Mobile Systems	2	1	0	3
EEE 845	Robust and Fuzzy Control Systems	2	1	0	3
EEE 847	Adaptive Control Systems	2	1	0	3
TOTAL		27			

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 801	Professional Engineering Management	2	0	0	2
EEE 893	Seminar	0	0	0	1
EEE 899	Master's Thesis Research Project	0	0	0	12
TOTAL		15			

(b) Communication Engineering Option

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 811	Engineering Mathematics	2	1	0	3
EEE 821	Advanced Analog and Digital Electronics	2	1	0	3
EEE 833	Digital Signal Processing	2	1	0	3
EEE 841	Classical Control Theory	2	1	0	3
EEE 851	Communications Theory and Systems	2	1	0	3
TOTAL		15			

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 822	Embedded Systems	2	1	0	3
EEE 840	Computer Applications in System Engineering	2	0	3	3

EEE 852	Digital Communication Theory	2	1	0	3
EEE 854	Antenna and Radio Wave propagation	2	1	0	3
EEE 892	Seminar	0	0	0	1
	One (1) elective course	2	1	0	3
TOTAL		16			

Electives

Course Code	Course Title	L	T	P	Units
EEE 824	Power & Industrial Electronics	2	1	0	3
EEE 826	Data Acquisition Systems & Instrumentation	2	1	0	3
EEE 855	Telephony	2	1	0	3
EEE 856	Frequency Spectrum Management	2	1	0	3
EEE 857	Broadcasting Systems	2	1	0	3
EEE 858	Telecommunication System Architecture & Networks	2	1	0	3
TOTAL		24			

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 801	Professional Engineering Management	2	0	0	2
EEE 893	Seminar	0	0	0	1
EEE 899	Master's Thesis Research Project	0	0	0	12
TOTAL		15			

(c) Power System Engineering Option

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 811	Engineering Mathematics	2	1	0	3
EEE 833	Digital Signal Processing	2	1	0	3
EEE 841	Classical Control Theory	2	1	0	3

EEE 863	Energy Conversion for Electric power Generation	2	1	0	3
EEE 871	Power Systems Engineering I	2	1	0	3
	TOTAL				15

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 824	Power & Industrial Electronics	2	1	0	3
EEE 840	Computer Applications in System Engineering	2	0	3	3
EEE 864	Industrial/Commercial System Engineering II	2	1	0	3
EEE 872	Power System Engineering II	2	1	0	3
EEE 892	Seminar	0	0	0	1
	One (1) elective course	2	1	0	3
	TOTAL				16

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
EEE 801	Professional Engineering Management	2	0	0	2
EEE 893	Seminar	0	0	0	1
EEE 899	Master's Thesis research Project	0	0	0	12
	TOTAL				15

Electives

Course Code	Course Title	L	T	P	Units
EEE 861	Electric Machine	2	1	0	3
EEE 862	Generalized Electrical Machines Theory	2	1	0	3
EEE 865	Power Stations	2	1	0	3
EEE 866	Renewable Energy Sources for Power Generation	2	1	0	3
EEE 874	Power System Protection & Control	2	1	0	3
EEE 876	Power Systems Stability	2	1	0	3
EEE 877	Interconnected Power Systems	2	1	0	3
EEE 878	Computer Methods for Power System Engineering	2	1	0	3
	TOTAL				24

8. COURSE SYNOPSIS

(a) PGD

EEE 701 Engineering Mathematics I (3 Units)

Review of matrix operation including inversion, Eigen values, Eigen vectors and Canonical transformations and application. Three dimensional vector representations, vector calculus, gradient, divergence and curl line, surface and volume integrals, laplacian operations. Greens, Stoke's and Divergence theorems and applications. Ordinary and partial differential equations, applications and physical problems. Complex variables, numerical analysis, special functions and integral, problem formulation, simple method of solution.

EEE 702: Engineering Mathematics II (3 units)

Complex variables: function, deviation, language series. Taylor series, Cauchy theorem, Cauchy formula, Cauchy integrals. Analytic functions, singular points, Residual problems, conformal problems and mapping. Special functions: Gamma, Delta, Beta and error functions. Fourier integral, Fourier transforms for solving partial differential equations.

EEE 703 Reliability Engineering: (3 credit)

Reliability concepts. Elementary Reliability Theory. Measures of reliability Failure Time Distribution Models. Exponential, Weibull model). Fault tree analysis (FTA)). Failure Mode, Effect and Criticality Analysis. Reliability growth. Maintainability and Availability.

EEE 704 Technical Report Writing (2 units)

Principle of communications. Preparation and writing of technical reports. Oral presentation. Use of visual aids and other communication equipment in technical and research presentations.

EEE 705 Numerical methods (3 units)

Gaussian elimination, Gauss-Seidel methods and Newton-Raphson iteration methods of solving linear equations. Forward and backward difference tables, central difference formula, Finite difference Solution to partial differential equations. Solutions of ordinary differential equations (1st and 2nd order) using Runge-Kutta method.

EEE 706 Law, Management and Entrepreneurship (3 units)

Principles of Management. Industrial group and organizational behaviour. Motivation. Industrial Law, legislation on wages, trade marks and patents, Laws of contract and sales of goods. Liability for industrial injuries. Industrial relations, trade unions, employer associations, wages bargaining and the role of the state. Relevant topics on entrepreneurship designed by the National Universities Commission for Nigerian Universities. Organization concepts; human resources management. Financial management. Production Management. Company Policy development strategies. Entrepreneurship. Patents, inventions. Trade marks and copyrights.

EEE 707 Statistical Methods (3 Units)

Descriptive Statistics: Central tendencies and dispersion. Elementary probability theory, conditional probability, Baye's theorem, probability distributions and applications. Elementary theories of sampling and estimation. Test of hypothesis and significance. Curve fitting, Linear and Multiple regression analysis; Linear correlation, Analysis of variance, Time series analysis. Statistical quality control for mean. Standard deviation, range, number of defects etc., sampling techniques, average sampling number, stochastic processes.

EEE 708 Engineering Economics: (3 credits)

Break-even analysis. Time value money interest ratios (P/F, P/A, P/G, etc.) Evaluating single alternative (PW, AW, KW, IRR, etc.) Decision making Among Alternatives (PW, AW, FW, 1RR, etc.). Equal Lives and Unequal Lives. Depreciation methods.

EEE 709 Engineer-in-the-Society (2 units)

Philosophy of science, History of engineering and technology. Safety in engineering and introduction to risk analysis. The role of engineers in nation building.

EEE 711 Circuit Theory I (3 credits)

Elementary signals. Dynamic circuit behaviour, oscillations. First and second order systems. Laplace and Fourier transforms. Time and frequency domain solutions of circuit equations. Stability. Transfer function concepts. Applications of network theorems. Single-phase and three-phase circuits. Two-port network analysis, Introduction to computer-aided analysis. Applications of Laplace transform to transient analysis of RLC circuits. Non-sinusoidal periodic waveforms. Non-periodic signals. Different methods of network synthesis including Cauer, Foster, Long Division method, partial fractions, etc. Conditions for Reliability. Synthesis of non-linear resistive circuits. Computer applications in the analysis and synthesis of linear and non- linear circuits.

EEE 713 Electrical / Electronics Engineering Materials: (3 credits)

Review of Atomic Theory. Electronics configuration of engineering materials. Band-bond theory of solid semiconductor devices- Dielectric and Magnetic materials. Masers and Lasers. Superconductivity; Magnetic alloys; ferrites. Optics.

EEE 715 Electromagnetic Fields and Waves: (3 credits)

Review of electromagnetic laws in integral form: Gauss' Law, Ampere's and Faraday's laws. Electrostatic fields due to distribution of charge, magnetic fields in and around current carrying conductors, Time varying magnetic and electric fields. Conduction and displacement currents. Maxwell's equations. Pointing vector, energy propagation, and boundary conditions.

EEE 717: Electrical Services Design (3 Units)

Lighting installation, Basic power installation, Power supply and distribution systems; regulations, IEE, NEC, Nigerian

standards, choice of cables and conductors, wire systems and accessories, Outdoor low voltage lines and cables, Protection of low voltage installation, Design of electrical installation - domestic, industrial and commercial. Earthing and testing of electric installation, illumination, proposals and contract document preparation. Use of Software such as Microsoft Visio, AutoCAD etc.

EEE 720 Solid State Electronics (3 credits)

Physics and properties of semiconductors including high field effects carrier injection and semiconductor surface phenomena. Devices Technology; bulk; and epitaxial material growth and impurity control. Metal-semi conductor interface properties, stability, and methods of characterization. Controlled and surface-controlled devices.

EEE 722 Electronics Devices and Systems: (3 credits)

Diode Circuits. Analysis of Single Stage Amplifier Circuits. Multi-stage Amplifiers. Oscillators- Power Supply Circuits. Wave-Shaping circuit, integrated circuits (ICs). OP Amps Circuits.

EEE 724 Power Electronics (3 credits)

Controlled Rectifiers. Converters. Switching characteristics of diodes, transistors, and transistors. Analysis of circuits using transistors as switches, power control circuits, characteristics of switching transformers, ac-dc converters. Power semiconductor devices protection. Waveform synthesis.

EEE 726 Digital Electronics: (3 credits)

Review of Boolean Algebra and Logic Circuits Simplifications. - Flip-flops. Counter, Registers, Memory Devices, Semiconductor Technologies; MSI, LSI, etc. interface Digital converters, e.g. ADC, DAC series/parallel converter, etc. Microprocessors, Digital Test and Maintenance Equipment.

EEE 728 Electrical/Electronics Measurements and instrumentation: (3 credits)

Principles of measurements: Measurement accuracy. Terminology. Signals, Potentiometers, and bridges. Instrument types: Voltage, current, power, energy, and resistance measurements. Electronics and electrical instruments. The cathode ray tube (CRO). Transducers; magnetic effects measurements. Data recording. Spectrum analyzers.

EEE 729 Micro Computer Hardware and Software Techniques (3 credits)

Elements of digital computer design; control unit, programming, bus organization and addressing schemes, microprocessor, system architecture, bus control, instruction execution and addressing modes. Machine codes, assembly language and high level language programming, microprocessors and stale machines. Microprocessors interfacing: Input and output technique, interrupt system and direct memory access; interfacing to analogue systems and application to D/A and A/D converters. System development

tools: simulators, EPROM programming assemblers and loaders. Microprocessor and microcomputers Operating Systems and compilers. microprocessor applications

EEE 734 Digital Signal Processing (3 credits)

Basic concepts and areas of applications. Discrete-time signals and systems; linearity, shift-invariance, causality, stability, convolution sum and frequency response. Review of sampling theory and Z-transform digital system realization Finite-impulse response (FIR) and infinite-impulse response (IIR) filter design. Discrete Fourier Transform (DFT) and Post Fourier Transform (FFT)

EEE 741 Control Systems Engineering I: (3 credits)

Open and closed loop systems. Modeling of Physical systems. Dynamic equations of electrical, mechanical, thermal and fluid flow systems. Transfer functions of control system components. System response and classification. Stability. Nyquist, Bode, Root Locus Analysis. Systems specifications and introduction to design.

EEE 742 Control Systems Engineering II: (3 credits)

Analogue computers. State space representation of control systems. Stability of linear and non-linear systems. Linearization of non-linear systems describing functions. Sampled data systems. Digital control.

EEE 748 Communication Systems (3 credits)

Telephony: Antennas and wave propagation mode. Radar systems. Satellite communication systems. Broadcasting systems (analogue and digital). Introduction to Wireless Communication Systems. Regulations. Telecommunication systems planning.

EEE 751 Communications Principles: (3 credits)

A general communications system including source, transmission channel, and destination. Analogue Modulation systems. AM, FM, Phase Modulation. Pulse Modulation: RAM, PWM, PPM, PCM. Introduction to Digital Modulation Technique. Bandwidth considerations. Devices and systems for communications.

EEE 754 Data Communications (3 credits)

Introduction to Data communication systems: digital signals and characters, data signals, band rate, serial and parallel data transmission. Networks and Network topology. Baseband Analysis, Modulated carrier signals (ASK, PSK, QPSK, BSK, MSK, GMSK, etc.). Coherent and non-coherent detection of binary signals. Error rate comparison OSI model and functions of file layers. TCT/IP model and functions of the layers. Network management; Telecommunication Network Management, International Standards.

EEE 756 Microwave Engineering: (3 credits)

Microwave Devices and Circuits: Variation Diode, Parametric amplifiers, tunnel diodes, Schottky diode. Gunn oscillators, frequency multipliers and up-converters. Microwave Theory

and Techniques; transmission lines and waveguides, passive microwave devices; resonators, magic tee, TWT, etc.

EEE 758 Computer Programming: (3 credits)

Flow-Charting and Algorithm Formulation. Coding with (C++, Visual Basic). High Level Languages (e.g. C++, Linux, Visual Basic). Applications to Solution of Engineering Problems.

EEE 761 Electrical Machines: (3 credits)

Electromechanical Energy Conversion systems. DC machines, transformer. Synchronous and Induction machines. The machine as a generator and as a motor. Analysis of electromagnetic torque.

EEE 762 Energy System (3 credits)

Global energy assessment. Primary and secondary energy sources. Renewable and non-renewable energy resources. Energy needs of the country. Energy conversion techniques. Energy conservation. Energy management and auditing. Cost of energy,

EEE 770 Electrical Power Principles: (3 credits)

Generation: Sources of Energy (thermal, hydro, nuclear, solar, wind, etc.) Economics of Power supply (Tariffs, Load curves. Power factor correction, etc.) Power generation. Transmission and Distribution. Corona. Types of cables, insulators. System Protection. Performance charts.

EEE 771 Power System Engineering (3 credits)

Modeling of synchronous machines, transformer, transmission lines including bundled conductor lines and untransposed lines. Network representation of power systems. Voltage and frequency loading dependency. Real Power balance and its effect on systems frequency Reactive power balance and its effects on system voltage. Load Flow Analysis: The load flow problem. Formulation of static load flow equations. Bus classification. Classification of system variables and generalization of n-bus system. Load-flow solution using Gauss-Seidel and Newton-Raphson methods. Sample case studies.

EEE 772 High Voltage and Switch Gear Engineering (3 credits)

Methods of generation and measurement of high voltages. Type and tests on switchgears. Mechanisms of dielectric breakdown in gases, liquids and solid. Protection against over voltages. Switchgear construction. Oil switches. Air blast, SF₆, Vacuum circuit breakers.

EEE 781 Laboratory Practical I (1 credit each)

Electrical Design and Installation, Electrical Circuit Theory

EEE 782 Laboratory Practical II (1 credit each)

Machines, Communication Principles, Control Engineering Systems

EEE 783 Laboratory Practical III (1 credit each),

Electric Power Principles, Digital Electronics

EEE 784 Laboratory Practical IV (1 credit each)
Data Communication

EEE 999 Project (6 credits)

project titles are to be selected from an approved list of suitable topics. The actual work is to be carried out under the supervision of a member of academic staff, the standard of work must demonstrate the ability of the student to undertake independent work at a professional level of competence. Each student is required to give a project defense seminar his/her work.

(b) M. ENG.

EEE 811 ENGINEERING MATHEMATICS - 3 Units

Presents the fundamentals of signal and system analysis. Topics include discrete-time and continuous time scale signals, Fourier series and transforms, Laplace and Z transforms, and analysis of linear, time invariant systems. Linear Algebra, numerical methods and computer application, Probabilistic models; stochastic processes, correlation functions, power spectra, spectral factorization. Least mean square error estimation; wiener filtering. Hypothesis testing; detection matched filters.

EEE 821 Advanced Analog and Digital Electronics 3 units

Discrete solid state devices - BJT, FET, UJT, SCR, Triacs; Linear Integrated circuits - op amps, voltage controlled oscillators, PLL, F to V converters. Review of logic circuits, SSI, MSI, LSI, micro-controllers elements of interfacing techniques.

EEE 822 Embedded Systems 3 units

Methodologies and technologies for design of embedded systems. Hardware and software platforms for embedded systems, techniques for modeling and specification of system behaviour, software organization, real-time operating system scheduling, real-time operating system scheduling, low-power battery and energy-aware system design, timing synchronization, fault tolerance and debugging and techniques for hardware and software architecture optimization.

EEE 824 Power and Industrial Electronics 3 units

Functional circuits and systems. Codes standard and symbols for industrial system electronics and related control Optoelectronics, industrial timing system, digital electronics system. Electrical energy sources for industrial loads. Principles of thyristor (SCR) devices, dynamic characteristics of DC choppers; Phase Control, full wave circuits with inductive load, commutation power inverter. Application of the devices.

EEE 826 Data Acquisition Systems & Instrumentation 3 units

Microprocessor development systems, programming using assembly and higher-level languages Implementation of embedded application algorithms Details of a contemporary

microprocessor architecture Comparative analysis of advance architecture and specialty architectures. Laboratory work is required Software development including multiple memory models, device drivers, basic network principle including internet applications.

EEE 828 Biomedical Instrumentation 3 units

Introduction to electrical instrumentation and a review of electronics instrumentation, data conversion techniques, biomedical transducers; conventional EEG and ECG machines, embedded systems for biomedical applications, biomedical expert systems.

EEE 830 Introduction to Data Structures and Algorithms 3 units

Introduces fundamental data structures, algorithms and abstract data types. Main topics include data structures such as arrays, linked lists, stacks, queues, graphs and trees, and algorithms such as those that are used for list manipulation, graph searches, sorting, searching and tree traversals. Implementation of data structures and algorithms in C++.

EEE 831 Contemporary Computer Systems 3

Basic concepts in architecture and microarchitecture: Partitioning, Timing, Pipelining, Data Path, state machine, microsequencer, microinstruction definition and microcode, Microprogramming (horizontal, vertical, two-level, dynamic microprogramming, bit steering). Extension to pipelining and pipelined control. Effective use of short pipelines, with some digressions into more effective use of long pipelines without blocking. The structure of a modern pipeline. Functions at each stage. CAD tools. The x86 ISA, and some implementation issues. Pipelining in the year 2004. Branch Prediction. The Trace Cache. The Block structured ISA. Simultaneous Multithreading. Clustering and its implications. Data Flow; HP's Pentium Pro and Pentium 4 implementations. Importance of Compiler technology to Future Microarchitectures. RISC, a Retrospective, Cache Coherency. Memory consistency. IEEE Floating Point arithmetic, The IEEE Standard Foremost. The IBM Power 5 microarchitecture.

EEE 832 Digital Signal Process 3 units

Application program interface and network transport services including User Datagram Protocol and Transmission Control Protocol from the Internet protocol suite. Client-server organization and design of synchronous, asynchronous, and multithreaded client and server applications. Design, implementation, and testing techniques to improve robustness and performance. Design and implementation of servers and clients for standard Internet application protocols.

EEE 833 Digital Signal Processing 3 units

Digital filter design and optimization tools, architectures for digital signal processing circuits; integrated circuit modules for digital signal processing; programmable signal

processors; CAD tools and cell libraries for application-specific integrated circuit design; case studies of speech and image processing circuits.

EEE 834 Wireless Networks and Mobile Systems

Multidisciplinary, project oriented design course that considers aspects of wireless and mobile systems. Including wireless networks and link protocols, mobile networking including support for the Internet Protocol suite, mobile middleware and mobile applications.

EEE 840 Computer Applications in Engineering Systems 3 units

A review of computer programming and other microprocessor methodology for systems analysis and synthesis. Incidence and network matrices. Algorithms for formation of network and system matrices. Iterative solution method. Computer-aided-design of engineering systems. Microprocessors and microcontroller in engineering systems planning, operation and maintenance.

EEE 841 Classical Control Theory 3 units

Control structures: open-loop, closed-loop and feed -forward. Basic methods for the mathematical modelling of physical systems. Continuity and compatibility relations. Case studies for mechanical, electrical systems, fluid, pneumatics, and thermal. Transient response analysis and steady state errors; Frequency response specifications, Stability analysis. Series and parallel compensation, P+I+D compensation, lag, lead, lead- lag compensator design; Brown's construction, use of Bode, Nyquist, Circle and inverse plots. Nichols charts for design. Control Systems Analysis in State Space including the concepts of controllability and observability of control systems. State space designs using pole placement for observer and servo systems as well as quadratic optimal control techniques. Samples data control: Approximate continuous to samples conversion, the effect of sampling rate, zero- order hold, stability.

EEE 842 Linear Multivariable and Optimal Control 3 units

Linear optimal regulator problem - finite-time horizon. Principle of optimality, Hamilton-Jacobi equation, Riccati equation. Steady state solution (LQR), algebraic Riccati equation. Properties: gain and phase margin, sensitivity, nonlinearities. Optimal state estimation (Kalman filter), output feedback control. Multivariable system representations and equivalent systems. Controllability and observability. Poles and zeros of multivariable systems. Pole placement using state and output feedback.

EEE 844 Control Theory and Industry 3 units

Statistical modeling and control in manufacturing processes. Use of experimental design and response surface modeling to understand manufacturing process physics. Defect and parametric yield modeling and optimization. Forms of process control, including statistical process control, run by run and

adaptive control, and real-time feedback control. Application contexts include semiconductor manufacturing, conventional metal and polymer processing, and emerging micro-nano manufacturing processes. Sequence control techniques; Industrial control sensors. Stabilization techniques; cement Industrial control applications; Steel Industry and Textile Control Systems; Agro-Allied, Industry application.

EEE 845 Robust and Fuzzy Control Systems 3 units

Analysis of systems where parameters are unknown but within known intervals. Structured and unstructured uncertainty. Signed and system norms, performance specifications. Uncertainty and robustness, small gain theorem. Norm-bounded uncertainty, quadratic stability.

EEE 846 Nonlinear Control Systems 3 units

Characteristics of nonlinear system behaviour; linearized models. Phase-plane methods; approximate construction of state trajectories. Describing functions: use in predicting oscillations. Piecewise-linear systems: point transformation method. Variable-structure Systems: sliding-mode control. Compensation for nonlinearities: feedback linearization, dither. Lyapunov function: methods of construction and use. Absolute stability: circle and Popov criteria, small gain theorem.

EEE 847 Adaptive Control Systems 3 units

System models for self-tuning: deterministic and stochastic. Structure of adaptive control systems. Adaptation methods: direct (implicit) and indirect (explicit). Estimation of parameters: gradient descent, recursive least squares. Controller design by pole assignment.

EEE 850 Signal Processing in Communications 3 units

Basic digital signal processing techniques for estimation and detection of signal in communication and radar systems. Optimization of dynamic range, quantization and state constraints; DFT, convolution, FFT, NTT, Winograd DFT, systolic array; spectral analysis- windowing, AR, and ARMA; system applications.

EEE 851 Communication Theory and Systems 3 units

Principles and techniques for modern communication systems: Basic concepts of Analog and digital communications systems; representation of band pass waveforms; signal space analysis and optimum receivers in Gaussian noise; comparison of digital modulation methods; synchronization and adaptive equalization; applications to modern communication systems; Analog and digital modulation, Pulse code modulation, time frequency multiplexing; Noise in communications systems.

EEE 852 Digital Communication Theory 3 units

Data Transmission: Theoretical and experimental evaluation of methods of modulation and synchronization for digital transmission over channels that introduces both noise and distortion: spread spectrum communication techniques; Digital

filtering techniques; Analysis of signals; Estimating and adaptive processes.

EEE 854 Antennas and Radio Waves Propagation 3 units

Properties of electromagnetic waves of frequency in the 100 GHz range in space, line and wave guide, methods of launching E-M waves. Propagation characteristics of space, effect of ground, ionosphere, troposphere. Effect of radiation path on design of radio system, Concept of antenna radiation patterns, radiation resistance, gain, effective area, reciprocity. Aperture antenna, traveling wave and Fl antenna, Analysis, design and evaluation of antennas. Principles of range and direction finding by means of radio echoes. Requirements and limitation of radar. Modulation and microwave components of radar.

EEE 856 Frequency Spectrum Management 3 units

Concepts of spectrum allocation to administration services that utilize the spectrum. Management Organization. The deregulation of the electronic media. Related Mathematical Computations. Coverage Area. Location Coordination. Radio frequency. Interference- Co-channel, Adjacent-Channel. General Management Processes. Frequency Assignment Sharing.

EEE 857 Broadcasting Systems 3 units.

Basic structure of broadcasting systems, types of transmitters, Terrestrial broadcast systems, satellite broadcasting systems, signal conditioning, up-link and down link features, specialized devices and impact of information technology on broadcasting systems.

EEE 858 Telecommunication Systems: Architecture and Networks 3 units

Analysis and design of integrated-service telecommunication networks and multiple-access procedures. Stochastic analysis of priority-based queuing system models. Queuing networks; network protocol architectures; error control; routing, flow and access control. Applications to local-area, packet-radio, satellite and computer communication network.

EEE 861 Electric Machines 3 units

Energy conversion: electromagnetic, magneto-electric; DC machines; AC machines (single phase, three-phase); synchronous, induction; Transformers.

EEE 862 Generalized Electric Machines Theory 3 units

Electrical machine principles Unified theory of machines and representation Method of machine analysis, steady state performance characteristics of a.c. machines. Analysis of lumped circuits. Normal and abnormal transients in machines and power equipment.

EEE 863 Energy Conversion for Power Generation 3 units

Electric energy and power, equivalent circuit for an electro-mechanical power conversion system Homopolar/heteropolar devices. Design of magnetic circuit. Synchronous

and asynchronous interaction. Steady-state, performances of synchronous converters.

EEE 864 Industrial/Commercial Power Systems Design 3 units

An introduction to power system design for commercial building and industrial plants Legal and economic consideration, equipment specification and ratings, design practice, fault calculation, grounding, illumination design, electrical heating. Cooling, lighting protection.

EEE 865 Power Stations 3 units

Conventional energy sources: fossil fuel, hydro; Types of power stations; Basic characteristics of power stations; Factors influencing choice of internal circuit; Characteristic circuit diagrams of different power stations.

EEE 866 Renewable energy Sources 3 units

Mini-hydro energy, wind energy, solar energy.

EEE 871 Power Systems Engineering 13 units

Basic characteristics of power systems; Load representation in schematic diagrams; Parameters and equivalent circuit of networks elements: power lines, transformers, autotransformers; Load flow studies of networks: solution of steady state load flow for simple networks; Load balancing; Voltage regulation in power systems; Sources of reactive power: characteristics and applications in power systems; Network design techniques; Economic considerations in network design solutions.

EEE 872 Power Systems Engineering II 3 units

Introduction to system stability theory: Types of disturbances/transients and stability of power systems; criteria of stability; measures for improving stability of a system; Introduction to protection and control of power systems: protective relay systems; protection of lines, machines.

EEE 874 Power Systems Protection and Control 3 units

Protective relay of power systems: step by step current protection of lines; Directional and differential protection of lines; Directional and differential protection; Remote protection; Protective relay of transformers: basic protection, protective reserve; Remote protection, current protection, directional and differential protection; overvoltage protection.

EEE 878 Computer Methods in Power Systems and Machines Design 3 units

A study of computer methods in electric power systems analysis, incidence and network Matrices, iterative solution method, computer-aided design of machines, computers and microprocessors in power systems operations and planning.

EEE 899 Master's Thesis Research Project 12 units

Independent engineering project demonstrating professional maturity, performed under at least one supervisor, who is a senior academic staff.

(c) Ph.D

EEE 999 Doctoral Research Project

Presently, candidates may apply for work in the following research areas:

1. Electronics - specialized instrumentation, Analogue, Digital, Physical;
2. Communications - Analogue, Digital, Spectrum Management, Modern Cell phone Communications;
3. Control - Applications to industry, Environment, Mechatronics, System automation and Instrumentation;
4. Power systems and national development Issues Power Systems - Management of electric Power Distribution Systems, system Load Flow and Network Stability; and.
5. Machines - Optimal machine design, specialized machines, industrial drive.

LIST OF ACADEMIC STAFF

S/N	NAME OF STAFF	QUALIFICATION	STATUS
1	Prof. A. O. Melodi	M.SC (Ukraine), Ph.D (Moscow)	Professor
2	Dr. S. A. Oyetunji	B.Eng. (Ilorin), M.Eng (Benin), Ph.D (Benin)	Snr. Lecturer
3	Dr. E. O. Ogunti	B.SC (Ilorin), M.SC., (Ile-Ife), Ph.D (Florida)	Snr. Lecturer
4	Dr. Y. O. Olasoji	M.Eng (Brn, Czech), PhD (Akure)	Snr. Lecturer
5	Dr. K. F. Akingbade	OND (Owo), HND(Ibadan), PGD, M.Eng, Ph.D (Akure)	Snr. Lecturer
6	Dr. A. A. Ponnle	B.Eng. (Akure), M.Eng (Akure), Ph.D (Sendai, Japan)	Snr. Lecturer
7	Dr. J. J. Popoola	B.Eng. (Akure), M.Eng. (Akure), Ph.D (Johannesburg)	Snr. Lecturer
8	Dr. Mrs. F. M. Dahunsi	B.Eng. (Ilorin), M.Tech (Bauchi), Ph.D (Johannesburg)	Snr. Lecturer
9	Dr. M. R. Adu	B.Eng. (Akure), M.Eng. (Akure), Ph.D (Akure)	Lecturer I
10	Dr. T. O. Ale	OND (Owo), B.Eng. (Akure), M.Eng. Akure), Ph.D (Akure)	Lecturer I
11	Dr. W. O. Apena	B.Eng. (Akure), M.Sc (Coventry), Ph.D (Coventry)	Lecturer I
12	Dr. M. O. Oyeleye	HND (Ibadan), PGD (Akure), M.Eng.(Akure), Ph.D (Akure)	Lecturer II

9.2.4 DEPARTMENT OF MECHANICAL ENGINEERING (MEE)

1. PROGRAMMES OFFERED

- a) PGD - Mechanical Engineering
- b) M. Eng - Mechanical Engineering
- c) Ph.D - Mechanical Engineering

- develop in the students a sound knowledge of Mechanical Engineering
- prepare students for further studies and managerial position in industries

2. AVAILABLE OPTIONS

- a) M. Eng with specialization in Building Services Engineering and Production Engineering.
- b) Ph.D with specialization in Building Services Engineering Production Engineering.

(c) Ph.D - Mechanical Engineering Philosophy

Under this programme, the students are trained for the award of Ph.D in both available options. Students are made to undergo research works for a minimum of three or five years depends on whether the student is on full-time or part-time respectively. The programme was designed, so that the student will be able to face academic and social challenges in the nearest future

3. PHILOSOPHY AND OBJECTIVES

(a) PGD - Mechanical Engineering

(i) Philosophy

Under this programme, the students are trained for the award of Post-Graduate Diploma (PGD) in Mechanical Engineering. The programme is designed for those who wish to bridge their academic career from the practical oriented course (Higher National Diploma) to a more theoretical course (Post-Graduate Diploma) in Engineering or those who wish to improve their academic career from the practical oriented to the more theoretical, research - based. studies in the University, and subsequently pursue higher degree course. Students are made to take some compulsory courses that will further prepare them for Management status in Industries. The programme is designed to enable both fresh graduates and practicing Engineers to acquire more theoretical and practical knowledge in engineering through taught courses and research works.

(ii) Objectives

The objectives of this programme are to:

- bridge the gap between the practical and theoretical knowledge
- enable the candidates with HND to further their academic career

(ii) Objectives: The objectives of this programme are to:

- expose students to advance research techniques in Engineering
- develop in the students advanced knowledge of Mechanical Engineering
- prepare students for independent research activities and managerial position.

5. ADMISSION REQUIREMENTS

(a) PGD - Mechanical Engineering

A candidate for PGD degree programme must in addition to the general University admission requirements hold one of the following qualifications:

- i. A first degree with at least 3rd Class grade in Mechanical Engineering and other related disciplines from the Federal University of Technology, Akure or other recognized Universities.
- ii. HND with a minimum grade of Lower Credit in Mechanical Engineering or their related disciplines from a recognized Polytechnic or University.
- iii. Any other qualification approved by the University Senate.

(b) M.ENG - Mechanical Engineering

A candidate for M. Eng degree programme must in addition to the general University admission requirements hold one of the following qualifications.

- i. A relevant first degree with grade not less than Second Class (lower) division from the Federal University of Technology, Akure or from a recognized University in Mechanical Engineering or any other relevant disciplines.
- ii. Postgraduate diploma in Mechanical Engineering from the Federal University of Technology, Akure or a recognized University with a Cumulative grade point average of not less than 3.50 of 5.0 grade point average.

(c) Ph.D - Mechanical Engineering

A candidate for Ph.D degree programme of the department must hold, in addition to the general University admission

requirements, a good Master Ddegree in Mechanical Engineering with a cumulative grade point average of not less than 3.50/5.0; from the Federal University of Technology, Akure. Equivalent degree in Mechanical Engineering or relevant field of studies from any other recognized University is also acceptable.

6. DURATION OF THE PROGRAMME

(a) PGD - Mechanical Engineering

Candidate shall be required to spend a minimum of four (4) semesters. Senate may approve an extension on exceptional cases.

(b) M. ENG - Mechanical Engineering

The required duration of the programme shall normally be required to spend between 18 and 24 Months on full time. Senate may approve an extension on exceptional cases.

(c) Ph.D - Mechanical Engineering

The required duration for the programme is as follows:

- i. Full time candidates shall normally be required to spend between 36 and 48 Months. Senate may approve an extension if required.
- ii. Part-time candidates shall normally be required to spend between 48 and 60 Months. Senate may be pleased to approve an extension if required

7. REQUIREMENTS FOR GRADUATION

(a) PGD - Mechanical Engineering

Candidate must complete a minimum of 63 units comprising 57 units of course work and 6 units of independent research work.

(b) M. ENG - Mechanical Engineering

To be eligible for M.Eng. degree of the Department, candidate must satisfactorily complete a minimum of 45 units; made up of 33 units of course work and 12 units of research work.

(c) Ph.D - Mechanical Engineering

The requirements for graduation shall be stated as follows: The candidate shall carry out a research work as approved by the appropriate organ of the University. In addition, if the candidate's transcript is deficient of some core courses at the Master degree level, the candidate shall take those courses as approved by the department.

8. COURSE OUTLINE

(a) PGD - Mechanical Engineering

FIRST YEAR

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 700	Seminar	0	0	3	1
MEE 711	Engineering in Society	2	0	0	2
MEE 713	Engineering Mathematics (I)	2	1	0	3
MEE 715	Engineering Materials	1	0	3	2
MEE 717	Engineering Thermodynamics	2	0	3	3
MEE 719	Engineering Graphics	2	0	3	3
Total					14

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 722	Computer Prog. & Numerical Methods	2	0	0	2
MEE 724	Engineering Mathematics II	2	0	0	2
MEE 726	Technical Report Writing	2	0	0	2
MEE 728	Statistical Methods	2	0	0	2
MEE 720	Strength of Materials	2	0	3	3
MEE 722	Fluid Mechanics	2	0	3	3
Total					14

SECOND YEAR FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 739	Engineering Law, Management & Enterp	3	0	0	3
MEE 731	Mechanics of Machines	2	0	3	3
MEE 733	Engineering Design I	2	0	3	3
MEE 735	Mechanical Vibration	3	0	0	3
MEE 737	Heat and Mass Transfer	3	0	0	3
Total					15

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 742	Engineering Design II	2	0	3	3
MEE 744	Automatic Control Systems	3	0	0	3
MEE 746	Engineering Maintenance	1	0	6	3
	Elective I	3	0	0	3
	Elective II	3	0	0	3
Total					15
MEE 799	PGD Research Project	0	0	18	6
Total					6

Electives

Course Code	Course Title	L	T	P	Units
MEE 750	Manufacturing Process/Introduction to CAM, Tools and Jig Design	2	0	3	3
MEE 752	Internal Combustion Engines	2	0	3	3
MEE 754	Metrology (Measurement & Instrumentation)	2	0	3	3
MEE 756	Energy Studies	3	0	0	3
MEE 758	Air Conditioning & Refrigeration	3	0	0	3
MEE 760	Foundry Technology	3	0	0	3
MEE 762	Engineering Metallurgical	3	0	0	3

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 899	Master's Thesis Research Project	0	0	0	12
	Total				12

(ii) Building Services**FIRST SEMESTER**

Course Code	Course Title	L	T	P	Units
MEE 801	Thermofluids	2	1	0	3
MEE 803	Heat and Mass Transfer	1	1	3	3
MEE 805	Noise and Vibration	1	2	0	2
	Total				8

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 802	Air Conditioning System	2	1	0	3
MEE 804	Refrigeration Processes	2	0	0	2
MEE 806	Mechanical & Electrical Installation on Building	1	1	3	3
	Total				8

(b) M.ENG - Mechanical Engineering**(i) Common Courses****FIRST SEMESTER**

Course Code	Course Title	L	T	P	Units
MEE 809	Design & Analysis of Industrial Experiments	2	1	0	3
MEE 817	Advance Engineering Mathematics	2	1	0	3
	Total				6

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 816	Project Management	2	0	3	3
MEE 818	Computer Programme	1	1	3	3
	Total				6

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 899	Master's Thesis Research Project	0	0	0	12
	Total				12

General Electives

Course Code	Course Title	L	T	P	Units
MEE 810	Applied Metrology	1	1	3	3
MEE 814	CAD/CAM for Manufacturing	1	1	3	3
	Total				6

(iii) Production Engineering Option**FIRST SEMESTER**

Course Code	Course Title	L	T	P	Units
MEE 807	Advanced Technique of Linear Optimization	2	1	0	3
MEE 811	Design for Production	1	1	3	3
MEE 813	Applied Manufacturing Engineering Methods	2	0	3	3
	Total				9

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
MEE 808	Advanced Technique of Non-Linear Optimization	2	1	0	3
MEE 812	Design and Manufacturing of Machine Tools	2	0	3	3
MEE 820	Applied Techniques of Production Management	2	0	0	2
	Total				8

THIRD SEMESTER

Course Code	Course Title	L	T	P	Unit s
MEE 899	Master's Thesis Research Project	0	0	0	12
	Total				12

(c) Ph.D - Mechanical Engineering

Course Code	Course Title	L	T	P	Units
MEE 999	Doctoral Research Project	0	0	0	12

9. COURSES SYNOPSIS

(a) PGD - Mechanical Engineering

MEE 711: Engineers in Society (2 units)

Definitions of Engineer in Society, Growth and effect of Technology on society, Industrial revolution, Modern development - power, transportation, communication etc. Professional bodies and Engineering Societies, Ethics, Cannons, Codes, Standards of Engineering Societies, The Roles and responsibilities of engineering personnel in Technological development and nation building. Education and Training of Engineering Personnel.

MEE 713: Engineering Mathematics I (2, 1, -) 3

Matrices. Vector Analysis. Partial Differential Equations. Complex Variables., Numerical Analysis. Special Functions and Integral. Probability and Sampling, linear Programming.

MEE 715: ENGINEERING MATERIALS AND APPLICATION (1, -, 3) 2

National and international standards for the classification of engineering materials, classes of materials; High temperature materials, packaging materials, high strength materials, optical and magnetic materials, automotive materials, tools, steels,

stainless steels, ceramics, polymers, cement, petrochemicals materials. Mechanism of deformation and fracture at elevated temperatures. Creep and fatigue theories. Yield criteria. Strengthening mechanisms of super alloys and refractory materials. Environmental effects on materials. 30h(T), 45h(P).

MEE 717: THERMODYNAMICS.(2, -, 3) 3. Review of Engineering fundamentals of thermodynamics (including laws, processes and cycles) selected issues: closed and open systems, energy degrading. Thermodynamics control, surface and volume analysis. Vapour and gas powe cycles. Internal combination engines. Properties of mixtures. Advanced treatment of fundamental combustion process. Mechanis of heat transfer and Heat exchange designs. Vapour compression and absorption refrigeration systems. Appicaation of thermodynamic theory ad design principles for comfort and cooling, food refrigeration and cryogenic systems. Properties of refrigerant, refrigeration. Control systems. Gas dynamics; Internal flow(pipes, noozles, etc), External flow(Aircraft, projectiles, etc), Waves(elastic, shock). Available and unavailable energy of systems.

MEE 719: Engineering Graphics (2,-,3) 3

Review of rotation of surfaces in various planes, Intersections programming. Assembly drawing. Introduction to Computer Aided Drafting.

MEE 720: Strength of Materials (2, -, 3) 3

Thick Shells: Determination of stresses and strains in single and compound cylinders under internal and external pressures. Stresses in axially thin, long and variable thickness rotating discs. Columns and struts: Theoretical analysis for short and long columns (e.g. the Euler formular, J.B. Johnson formula, cook column formula etc). Derive and explain buckling heads of columns for pin jointed built-in ends combinations' of both. State the limitations of the. theory and apply empirical equations to determine the buckling loads. Bending of beans and circular plates: Determination of stresses in bars of large and small curvatures and combined bending and direct stress. Shear centres of unsymmetrical beams. Formulation of plastic hinge, collapse loads, simply supported and fixed beams. Stresses and deflections in bending of thin circular plates with small deflections. Plastic theory of bending. Torsion of Shafts: Combined bending and torsion in shafts. Stresses in non-circular shafts. Wrapping function in the torsion of non-circular shafts. Riveted and bolted connections: Types of riveted joints and their classifications. Determination of strength of rivet and plate. Strength and efficiency of joints. Stresses due to eccentric loading of joints and joints under torsional loading. Mode of failure of joints. Elasticity theory: Stresses - strain relations. Two dimensional stress and strain. Analysis of stresses in three dimensions using Mohr's circle. Experimental stress analysis: Model analysis. Scale factors and materials. Principles of electrical strain gauge for strain measurement. Basic introduction to photo elasticity -birefringence, soclinics, isochromatics, stress optic law.

MEE 722: Computer Programming (1, -, 3) 2

Programming Technique - flow charting and building of algorithms, Review of numerical methods, Software; machine language, Computer language e.g. BASIC, COBOL, ALGOL, FORTRAN, VISUAL BASIC, C++, FORTRAN statements - Arithmetic Control - Inputs / output - FORMAT - Do Statement programme for simple problems. Subscripted variables and Matrix operations. Writing subroutines and sub - programmes. Computer packages (Windows, Excel, AUTOCAD etc).

MEE 724: Engineering Mathematics 11(2,1, -) 3

Revision: Polynomials, Roots of Equations, Remainder Theorem, Curve Sketching and Curve Fittings. Matrices: Equations and Application to real life problems. Vector Analysis: General Knowledge and Application to Two- and Three - Dimensional problems (Motion Study). Partial Differential Equations: Including Application to limits of power series. Complex Variables: including Linear, quadratic and Complex Transformations from real to imaginary planes.

MEE 726: Technical Report Writing (2,-,-) 2

Introduction to the principles of effective communications with attention to the importance of emphasis, emotion contact and style. Principles of technical writing Organisation and preparation of technical report (including proper referencing). Technical correspondence. Date assisting and deduction in presentation. Oral presentation of technical reports. Technical aid in presentation.

MEE 728: Statistical Methods (2, -, -) 2

Descriptive Statistics: Central tendencies and dispersion. Elementary probability theory conditional probability Baye's theorem, probability distributions and applications. Elementary theories of sampling and estimation. Test of hypothesis and significance. Survey fitting, Linear and Multiple regression analysis; Linea correlation. Analysis of variance, Time series analysis. Statistical quality control for mean, standard deviation range number of defects etc., sampling techniques average sampling number stochastic processes.

MEE 731: Mechanics of Machines (2, - ,3) 3 Units

Dynamics of Rigid Body: Analyses of inertia forces and torques. Advance: Kinematics of mechanisms. Two dimensional rigid body problems. Governors and Operation Principles Construction and operations of different engine governors. Calculation of forces and ranges of speeds 01 governors. Balancing of rotating masses: Analyses of the balancing of rotating masses in the same and in different planes. Determination of primary and secondary balancing forces and moments of reciprocating machines, compressors. Effects of balance on the performance characteristics of vehicles and other machines. Cam Valves and their applications: Principles of operation of various cams; analyses of off-set roller and tangent cam with roller followers: Calculations on cams (e.g. displacement of followers, velocity, angles, etc.). Gyroscope and its

applications: Analyses of forces and moments acting on a gyroscope. Determination of the gyroscope couple. And acceleration for a plane disc. Effects of gyroscopic couple on the whirling of shafts. Applications of gyroscope in automobile, ships, aero planes and locomotives.

MEE 732: Fluid Mechanics (2,-,3) 3

Kinematics and dynamics of fluid motion. Applications to fluid machinery, fluidics , propulsion system, Elementary hydrodynamics. Properties of real fluid, incompressible and compressible fluid, ideal, viscous and compressible fluids under internal and external flow conditions. Inviscid flows, boundary layer, normal and shock wave and flow machines.

MEE 733: Mechanical Engineering Design I(2,-,3)3

Failure theories combine loading: Fatigue and fatigue design. Shaft design. Power transmission: Gear, belt, rope, and chain drives, Types of joints. Analysis, synthesis and evaluation procedure in creative design. Use of codes, standards, charts, tables and empirical data. Thick and thin walled pressure vessels. Rotating cylinders. Creative group design project.

MEE 735: Mechanical Vibration (3,-,-) 3

Free and forced vibration of lumped mass - spring systems with and without damping in single, double and multi-degrees of freedom. Response to harmonic periodic, and non-periodic excitations. Matrix methods and Eigen value problems, natural frequencies, modes of vibration and resonance. Transverse vibration, whirling of shafts and torsional .vibration. Vibration Isolation.

MEE 737: Heat And Mass Transfer (3,-,-) 3

Steady states condition: review of fundamentals; application to engineering services. Convective heat transfer: Forced convection heat transfer in Laminar and turbulent flow; thermal boundary layer; flat plate heat transfer. Design aspects of heat exchangers: Basic types; design and selections; fundamentals of mass transfer; molecular mass transfer; diffusion coefficient; convective mass transfer. Steady state molecular diffusion: One-dimensional mass transfer: diffusion - a through a stagnant layer.

MEE 739: Engineering Law Management and Entrepreneurship (3,-,-) 3

Management concepts making organizational structure. Motivation, Leadership styles and functions. Bureaucracy. Authority, informal organization. Organizing and controlling. Departmentalization and coordination. Controlling, collective bargaining. Work and motion study, critical path method (CPM). Inventory control. Assembly line balancing and line of balance analysis scheduling. Nigerian legal system as it affects engineering: Industrial safety laws; Industrial law and labour relations; Law of contracts and tort; Agency law; Patent law; Principles and types of business ownership, including

advantages and disadvantages of each; Steps in setting up a partnership.

MEE 742: Mechanical Engineering Design II(2,- ,3)3
Thermal stresses in cylinders. Bucking theory for cylinder, design for external pressure. Pipe flexibility analysis. Smooth and mitred pipe bends. Ranged design, .plastic analysis of shell structures - yield surfaces and applications to circular plates and cylinders. Design of pressure vessel ends - flat and dished ends. Design of branch reinforcement, particularly nozzles in spheres. Introduction to CAD/CAM. 30h(T); 45h(P).

MEE 744: Automatic Control System (3,-,-) 3

Mathematical Modeling of Dynamic System: Dynamic equations of mechanical (translational and rotational), electrical, electromechanical, hydraulic, thermal and pneumatic systems). Transfer function of control system components: Transfer function of mechanical devices (simple lever, compound lever, differential lever gyroscope, gears); electrical .and electronic circuits. (field-controlled and armature - controlled d.c. motor servo-motor, operational amplifier circuits), pneumatic components (bellows flapper - valve, relay, actuator); hydraulic components (valve, -linear actuator). Block diagram and linear graphs. Time-response analysis: Standard test signals (step, ramp or impulse signals) time response of first-order and second order systems: Steady-state errors and error constants. Frequency - response analysis: Nyquist and Bode plots - by sketching and use of experimental data. M - and N - Circles. (closed - loop frequency response). Analysis of system stability: Concept of system stability. Routh - - Hurwitz criterion and applications Nyquist stability criteria. Gain margin and phase margin. Relative stability using Nyquist criterion. Root locus method: The root locus concept. Construction of root loci. Interpretation of the root locus diagram. Introduction to systematic control design (system compensation): Need for system compensation. Preliminary design considerations. Series and parallel (feedback) compensation. Compensation using lead, lag and lead- lag devices and their practical realization in mechanical, pneumatic and hydraulic systems. Effect of proportional (p), Integral (I) and Derivative (D) control actions on system performance. System compensation using the root - locus of Bode Approach. Analogue Computer Simulation: Need for computer simulation. Analogue computing elements. Analogue computer simulation of control systems. Computer operating modes. Amplitude and time scaling. (30h('I'), 45h(P).

MEE 746:Mechanical Engineering Maintenance (1,- ,6) 3

Importance of maintenance organization: Factors of maintenance (primary &secondary). Types of maintenance: breakdown, preventive, predictive etc. strategies for effective maintenance. Maintenance of industrial mechanical equipment (practical maintenance); types (preventive, repair or corrective, project improvement). Mechanical maintenance

of generators: fuel injection systems, engine starting procedures, causes of engine failures (faults/remedies). Machine tools maintenance definition, maintenance characteristics, advantages of maintenance (economic, technical, organizational and human), maintenance. Systems (schedule and procedures, lubrication, cleanliness, fault indications-vibrations, chatter, overheating and intermittent operation of equipment). Mechanical maintenance of - compressors; types, maintenance (mounting and alignment - foundation, anchor bolts, alignment, and misalignment), belt driven installation. Maintenance of mechanical drives friction and mesh drives (types and maintenance). Hydraulic and pneumatic system maintenance: definitions and types of maintenance. Types and properties of hydraulic fluids. 30h(T); 45h(P)

MEE 750: Computer Aided Design and Manufacturer (1, -, 3) 3

Introduction to computer aided design. Information generation, retrieval, analysis and use. Simulation: Modeling, verification and validation. Digital simulation . languages, features and comparison. Simulation and performance of controllers tools path simulation. Database: Interface with manufacturing, drafting. Powers control, inspection, technical illustration and other units. Graphic: graphic software, instruction. Display file: Transformations, windowing, perspective, hidden lines removal etc. Design packages. Documentation and manufacturing assistance from design database, drawing and flowchart. Installing a . CAD system. CAD hardware: workstation, seats, mouse and tablets, plotter, printer.

MEE 752:Internal Combustion Engines (2,-,3) 3

Review of basic thermodynamic principles. Hydrocarbon fuels, structures properties and test methods, alternative fuels for internal combustion engines. Combustion: Stoichiometry, effects of dissociation, residual; fraction, etc. fuel-air cycle analysis using combustion charts/ piston engine combustion phenomena, pre-ignition, detonation and knock Exhaust gas emissions, formation characteristics, effect, methods of measurement and reduction. Legal requirements. fluid mechanics of internal of internal combustion engines, fuel metering, injection and exhaust systems. Alternative engines: Gasturbine, wankel, sterling, electric etc. characteristics method of measurement and reduction. Design of engine components. Tube charging, Engine Tests.

MEE 754: Measurement and Instrumentation (Metrology) (3,-,-) 3

General Principles of instrumentation and measurement precision and accuracy measurement of lengths rays; block gauges, comparison with know lengths, graduate scales rotation of screwed shaft, angular measurement-combination angle gauge sine base author collimator angle decor, precision level: Determination. of straightness of surface. Measurement of form optical measurement of screw threads: major / minor diameter, simple effective diameter, thread pitch, thread form, virtual.

MEE 756:Energy Studies (3,-,-) 3

Analysis of energy demand in society. Types, grades, and applications, sources and resources. Energy conservation, Conversion, combustion, Nuclear fission and fusion. Hydro - energy alternative sources of energy. Solar, geothermal, wind and tides power generation. Economic, environmental, political and social considerations. 30h(T); 45h(P)

MEE 758: Refrigeration, Air Conditioning and Other Building Services (3,-,-) 3

Review of psychometrics. Air conditioning equipment/ components, boilers and chillers, cool towers, heat pumps - characteristics, design and selection techniques. Cryogenics, types and application of pipes. Pipe fitting. Lighting - sources, characteristics, design and applications. Heat gain from solar and other sources. Factors influencing solar gains. Air conditioning load due to solar gain through glass, infiltration, heat gains through lighting, occupants, and other appliances. Firefighting systems, equipment's code and regulation. Environmental pollution. Vertical transportation system.

MEE 760: Foundry Technology (3,-,-) 3

Pattern making technology; Materials, and tools for pattern making; Mould and core making technology: Sands used moulding: Moulding processes; machine moulding; Core sands and core making; Casting procedure; Casting methods; Gating systems; Casting design; Melting furnaces Refractories for melting unit; Metallurgical characteristics of cast metals; Pollution control in foundries.

MEE 762: Engineering Metallurgy (3,-,-) 3

Crystal structures of metals and alloys: binary and ternary phase diagrams. Characteristics of alloy micro- structure. Nucleation and growth, solidification. Metallurgical microscopes, and techniques for microscopic observation. Alloys and alloy steels. Classification and grading of alloy steels. Normalizing, annealing, hardening and tempering treatment for steel, surface hardening, precipitations hardening of steels. Austempering and martempering of steel. Heat treatment for copper and aluminium alloys. Corrosion and oxidation phenomenon mechanical working of metals. 30h(T) 45h (P).

MEE 799. PGD Research Project (-, , 18) 6

Industrially oriented research project relevant to individual candidates area of specialization.

(b) M. ENG - Mechanical Engineering**MEE 801: Thermofluids (3 Units)**

Mathematical development of the 1st and 2nd laws and their applications to the formulation of thermodynamic properties; thermodynamics of binary mixtures and equilibrium of phases; fugacity and entropy changes at constant temperature; gas liquid-fraction. Fluid flow Fans and pumps and their characteristics; pressure drop in pipes and ducts; design methods for air and water distribution system; steady and pulsating compressible flow.

MEE 802: Air Conditioning Systems (3 Units)

Physiological and comfort conditions for air conditioning: Types of systems and their suitability for a various applications. Design of Air-conditioning Systems. Insulating Materials. Psychometric Duct and pipe design. Air-Conditioning Equipment. Ventilation and Filtration. Case Studies - this involves load estimating, duct pipe sizing and equipment selection with detailed installation diagrams.

MEE 803: Heat and' Mass Transfer (3 Units)

Solution of the heat diffusion equation by analytical and numerical methods. Convection, boiling and condensation. Radiation. Mass transfer by diffusion and convection. Analogies with momentum and heat transfer.

MEE 804: Refrigeration Processes (3 Units)

Advance treatment of the vapour compression cycle Complex cycles and cascade systems. Absorption refrigeration systems and their analysis. Cooling load estimation in refrigeration applications. Refrigerants - Properties miscibility, lead detection, development of fluorocarbons and specific uses. Alternative refrigerants, CFC and ozone depletion. Applications and Case Studies - Economic considerations, water chillers, storage design, food freezing. Ice making, dairy, ice cream. Refrigeration in transportation, computer applications to analysis and design of refrigeration and air-conditioning system.

MEE 805: Noise and Vibration (2 Units)

Sources of noise and its measurement. Sound pressure and sound power. Noise criteria (N.C) curves. Noise propagation. Noise measurement. Occupational problems of Noise. Attenuation of noise. Importance of vibration. Classification. Analysis procedure. Free vibration of single' degree of freedom systems, Harmonically excited vibration. Vibration under general forcing conditions. Two degrees of freedom system, Determination of Natural frequencies and mode spaces. Vibration control. Vibration measurements.

MEE 806: Mechanical and Electrical Installations in Buildings (3 Units)

Plumbing design for water systems, fire hydrants and gas installations. Case studies of plumbing design for large and small buildings. Lifts. Types: Equipment (including machine room equipment); sound installation design factors and selection criteria: lifts specifications electrical Installation - Review of fundamental laws of electrical induction and application to household and industrial needs: Principles of electricity generation; Energy resources: Renewable and non-renewable energy resources; Different types of turbine for electricity generation, Basic principles of transmission and distribution; the high tension overhead lines the step-up power transformers and local center: the transformer principle: the Nigerian grid; supply to presidential houses and large estates. Electrical Supply. Circuits - Power supply to buildings and equipment. Lighting wiring design and types of wiring systems. The Nigerian wiring regulations and IEE wiring regulations. Safety Precautions.

MEE 807: Advanced Techniques of Linear Optimization (3 Units)

Linear Programming, Integer Programming. Network Analysis. Dynamic Programming. Network Analysis. Dynamic Programming. Game theory.

MEE 808: Advanced Techniques of Non-linear Optimization (3 Units)

Probability theory: Queuing theory: Inventory Models Mar4kovian decision processes and applications. Reliability. Decision analysis. Quadratic programming. Convex programming. Simulation.

MEE 809: Design and Analysis of industrial Experiments Planning of Experiments (3 Units).

Basic statistical methods, the normal distribution. Principles of experimental designs. The analysis of data from orthogonal designs, functional experiments, response surface and mixture designs, analysis of covariance; balanced in complete block and general non-orthogonal block design ransom effect models: variance components and sampling schemes.

MEE 810: Applied Metrology (3 Units)

Basic considerations' of measurement. Slip gauges. Tolerance and Limit system. Screw thread tolerance. Gauge tolerances. Measurement of straightness, flatness, roundness, profile measurement, measuring machine and comparators. Internal measurement. Screw threads and gear measurement techniques. Surface texture assessment and instruments. Inspection and gauging. Quality control. First and second order systems. Transducers. Force and Torque measurement. Application of laser in metrology.

MEE 811: Design For Productions (3 Units)

Design element of basic manufacturing processes such as weld-meats, casting including pattern making. Design of shafts and other power transmission elements for assembly. Design for batch production and flow-line production. Standards and preferred numbers. Hydraulic and pneumatics element. NU/ CNC concepts in design. Design concepts in non-cutting processes. Design of templates jigs and fixtures.. Design of bodies and frames. Design of cutting tools and process tools. Economics and ergonomics of design and manufacture.

MEE 812: Design and Manufacture of Machine Tools (3 Units)

Design principles of lathes, milling machines and drilling machines. Manufacture of transmission elements bodies and frames in machine' tools, Hydraulic: Pneumatic and electrical transmissions. Installation and testing of machine tools. Machine tool; maintenance. Jigs and fixtures in machine tools. NCCNC control.

MEE 813: Applied Manufacturing Engineering Methods (3 Units)

Metallurgical properties of engineering materials. Basic machining techniques. Sheet metal work. Metal forming processes such as forging, rolling sheet and wire drawing etc. Finishing processes. Welding technology. Foundry technology. Polymer processing.

MEE 814: CAD/CAM for Manufacturing (3 Units)

Application of CAD/CAM to plant layout. Computer integrated manufacturing and solids modeling. CAD/CAM workstations. Use of finite element analysis, geometric modeling and physical simulation to study the state and dynamic characteristics of products to be manufactured.. Interface and function of the CAD/CAM system to the shop floor.

MEE. 820: Applied Techniques of Production Management (2 Units)

Design of production system. Plant layout, materials handling. Production planning and Control. Works study. Resource allocation methods. Market analysis. Maintenance management. Quality assurance.

MEE 816: Project Management (3 Units)

Project feasibility analysis, Project Planning. Scheduling and Control using network methods. Project costing. Cost duration analysis. Limited resource scheduling. The resource balancing problem. Project reporting.

MEE 817: Advance Engineering Mathematics (3)

Complex numbers and hyperbolic function. Matrices and vector spaces to include eigenvalues and eigenvectors, Raleigh - Ritz method of solution of mechanical vibrations. Fourier's - Drrichlet conditions Fourier co-efficient. Discontinuous functions integration and differentiation. Complex Fourier series: Higher order ordinary differential equations. Partial differential equations general and particular solutions, separation of variables and other methods. Complex variables. Numerical methods. Finite element method.

MEE 818: Computer Programming (3 Units)

Fortran Language Fundamental computer sciences. File processing. Data .structures and algorithms. Operating system. Programming using C+ + and Visual basic. Basic computer architecture. Software engineering. Computer installation. Introduction to computer networks.

MEE 899: Master' Thesis Research Project (12 units)

Research projects that are industrially oriented and must be relevant to individual area of specialization.

(c) Ph.D· Mechanical Engineering.

Not applicable .

LIST OF ACADEMIC STAFF

S/N	NAME	DESIGNATION/STATUS	AREA OF SPECIALISATION
1	Prof. O.P. Fapetu	Professor	Building Services
2	Prof. M.A. Akintunde	Professor	Building Services
3	Prof. B. Kareem	Professor	Production/Industrial
4	Prof. E.I. Bello	Professor	Building Services
5	Dr. P.K. Oke	Reader	Production/Industrial
6	Dr. S.P. Ayodeji	Senior Lecturer	Production/Industrial
7	Dr. S.A. Anjorin	Senior Lecturer	Building Services
8	Dr. I.F. Titiladunayo	Senior Lecturer	Building Services
9	Dr. C.O. Ijagbemi	Senior Lecturer	Building Services
10	Dr. B.O. Akinnuli	Senior Lecturer	Production/Industrial
11	Dr. T.I. Ogedengbe	Senior Lecturer	Production/Industrial
12	Dr. O.A. Dahunsi	Senior Lecturer	Production/Industrial
13	Dr. P.B. Mogaji	Senior Lecturer	Production/Industrial
14	Dr. A.O. Akinola	Senior Lecturer	Building Services
15	Dr. O.O. Awopetu	Senior Lecturer	Production/Industrial
16	Dr. T.I. Mohammed	Senior Lecturer	Production/Industrial
17	Dr. M.K. Adeyeri	Senior Lecturer	Production/Industrial
18	Dr. T.S. Mogaji	Lecturer I	Building Services
19	Dr. T.E. Abioye	Lecturer I	Production/Industrial
20	Dr. P.K. Farayibi	Lecturer I	Production/Industrial
21	Dr. S.S. Yaru	Lecturer I	Building Services
22	Dr. O. M. Olabanji	Lecturer II	Production/Industrial
23	Dr. O. O. Ojo	Lecturer II	Production/Industrial

9.2.5 DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING (MME)

1. PROGRAMMES OFFERED

- a) Postgraduate Diploma (PGD)
- b) Master of Engineering (M. Eng)
- c) Doctor of Philosophy (Ph. D)

2. AVAILABLE OPTIONS/ SPECIALIZATION

a) PGD (Metallurgical and Materials Engineering)

M. Eng with specialization in

- i. Minerals Engineering (Mineral Processing Technology/Extraction Metallurgy)
 - ii. Production / Mechanical Metallurgy
 - iii. Physical Metallurgy/ Corrosion Engineering
 - iv. Advanced Materials Engineering
- c) Ph. D with specialization in**
- i. Minerals Engineering (Mineral Processing Technology/Extraction Metallurgy)
 - ii. Production Metallurgy
 - iii. Mechanical Behaviour of Materials
 - iv. Physical Metallurgy /Corrosion Engineering
 - v. Advanced Materials Engineering.

3. PHILOSOPHY AND OBJECTIVES

(a) PGD and M.Eng:

In order to have an in-depth knowledge of the basic principles underlying the body of knowledge in Metallurgical and Materials Engineering, candidates are trained to develop broad analytical mind that would enhance major intellectual and technological breakthrough and also to provide each student the opportunity to develop his special area of interest. This is to enable each student to learn the fundamental concepts of special fields in Metallurgical and Materials Engineering that will enable them to achieve the highest degree of professional competence. Furthermore, the M.Eng degree is offered such that the students are adequately versed in their disciplines and are taught advanced courses with emphasis on developing sound theoretical and applied knowledge relevant to the Mineral, Metallurgical and Engineering Materials Industries.

(b) Ph D

Ph.D candidates are trained to develop broad analytical mind that would enhance major intellectual and technological breakthroughs to improve production in Mineral, Metallurgical and Engineering Materials Industries. Furthermore, the Ph.D. degree is offered such that the students are adequately versed in their disciplines and be competent in imparting the knowledge to others in a conducive academic environment to ensure the continued existence of the system.

4. ADMISSION REQUIREMENTS

(a) PGD

Prospective candidates for the programme must possess any of the following academic qualifications:

- i. Higher National Diploma in Metallurgical and Materials Engineering with minimum grade of lower credit from recognized institutions of higher learning.

- ii. Bachelor of Science Degree in relevant applied Physical Sciences with a minimum of Third Class Honours/Second Class Lower Division from a recognized University. They would require taking basic engineering sciences at the undergraduate level (This include Engineering drawing, strength of materials, applied mechanics and machine design, and engineering thermodynamics).
- iii. B. Eng. or B.Sc. Degree (3rd class) in Metallurgical and Materials Engineering from a recognized University.

(b) M.Eng

Candidates with a Bachelor Degree in Metallurgical and Materials Engineering and related fields with a minimum of second class lower from this or any other recognized university are eligible to apply for admission into the programme.

Holders of Postgraduate Diploma in Metallurgical and Materials Engineering with at least Upper Credit pass may be considered.

Previous industrial experience and professional qualifications will be an added advantage.

(c) PhD

The admission requirements include:

M. Eng. or M. Sc in Metallurgical and Materials Engineering with a minimum score of 60%.

6. DURATION OF PROGRAMME

a) PGD

The programme is for a minimum of four (4) semesters of course work and project.

b) M. Eng

The duration is 18 to 24 months for the full time M. Eng programme, including course work and project.

c) Ph. D

The duration is 36 to 48 months for full time PhD candidates, while that of part-time programme is 48 - 72months.

7. REQUIREMENTS FOR GRADUATION

a) PGD

To qualify for the award of Postgraduate Diploma in Metallurgical and Materials, a candidate must have been credited with at least 69 units of compulsory courses, which include the project work.

b) M. Eng

Candidates for the award of M. Eng. Degree in Metallurgical and Materials must satisfy the following requirements:

- i. Complete successfully 36 unit courses both first and second semesters which include project work for all areas of specialization.
- ii. Conduct a prescribed project work and submit the required number of copies of thesis for examination
- iii. Present at least two seminars on his or her project (proposal/progress and final) before the viva

- iv. Perform satisfactory well during the oral examination (viva) of his thesis;
- v. Revise and submit the required number of copies of the thesis after examination as specified.

c) Ph. D

Candidates for the award of Ph.D Degree in any of the options in Metallurgical and Materials Engineering must satisfy the following requirements:

- i. Conduct a prescribed research work. Present at least three (3) seminars (proposal, progress and pre-viva) before the viva.
- ii. Submit the required numbers of copies of thesis for examination.
- iii. Perform satisfactory well during the oral examination (viva) of his thesis.
- iv. Revise and submit the required number of copies of the thesis after the examination.

8. COURSE OUTLINE

A. PGD

FIRST SEMESTER

Course Code	Course Title	L	T	P	Units
MME 701	Structure and Properties of Materials	2	0	3	3
MME 703	Production Metallurgy	3	0	0	3
MME 705	Mineral Processing	2	0	3	3
MME 707	Engineering Drawing	0	0	9	3
MME 711	Engineering Mathematics	2	0	3	3
MME 713	Statistical Method for Engineers	2	0	3	3
Total					18

SECOND SEMESTER

Course Code	Course Title	L	T	P	Units
MME 704	Engineers in Society	1	0	3	2
MME 706	Extraction & Refining of Materials	1	1	3	3
MME 708	Metallurgical Thermodynamics	2	1	0	3
MME 710	Physical Metallurgy I	3	0	0	3
MME 712	Metallurgical Engineering Laboratory	0	0	6	2
MME 718	Introduction to Engineering Materials	2	0	0	2
MME 724	Numerical Methods & Computer Programming	0	0	9	3
Total					18

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
MME 715	Physical Metallurgical II	3	0	0	3
MME 717	Extraction & Refining of Materials II	2	0	3	3
MME 719	Heat and Mass Transfer	2	1	0	3
MME 721	Metals & Materials Process/Plant Design	2	0	3	3
MME 729	Technical Report Writing	2	0	0	2
MME 731	Law, Management and Entrepreneurship	2	0	3	3
Total					17

FOURTH SEMESTER

Course Code	Course Title	L	T	P	Units
MME 716	Polymer Technology	2	0	0	2
MME 722	Corrosion Engineering	2	0	1	3
MME 726	Fuel, Furnaces & Entrepreneurship	2	0	1	3
MME 799	Project	0	0	18	6
Total					14

B. M.ENG

FIRST SEMESTER

(Compulsory courses for all area of specialization)

Course Code	Course Title	L	T	P	Units
MME 801	Advanced Process Metallurgy	2	0	3	3
MME 803	Advanced Physical Metallurgy	2	0	3	3
MME 805	Mechanical Behavior of Materials	2	0	3	3
MME 809	Materials Design and Selection	2	0	3	3
TOTAL					12

SECOND SEMESTER
(Mineral Engineering (Mineral Processing Technology/Extractive Metallurgy)

Course Code	Course Title	L	T	P	Units
MME 812	Fuels, Refractories and Furnace	2	0	3	3
MME 814	Advanced Mineral Processing Technology	3	2	0	3
MME 818	Advanced Ferrous and Non Ferrous Extractive Metallurgy	3	2	0	3
MME 822	Metallurgical Process/ Plant Design and Econ.	3	2	0	3
					12

Physical Metallurgy/Corrosion Engineering

Course Code	Course Title	L	T	P	Units
MME 826	Advanced Forming Processes	2	0	3	3
MME 828	Advanced Welding and Joining Processes	2	0	3	3
MME 830	Advanced Foundry Technology	2	0	3	3
MME 836	Fracture Mechanics and Failure Analysis	2	0	3	3
	TOTAL				12

THIRD SEMESTER

Course Code	Course Title	L	T	P	Units
	Phase Transformations & Experimented Techniques	2	0	3	3
	Advanced Heat Treatment Processes	2	0	3	3
	Fracture Mechanics and Failure Analysis	2	0	3	3
	Advanced Corrosion Engineering	2	0	3	3
	Total				12

Course Code	Course Title	L	T	P	Units
	Advanced Engineering Materials	3	0	0	3
	Nano-Science and Engineering	3	0	0	3
	Polymer Science and Engineering	2	0	3	3
	Biomaterials	3	0	0	3
	Total				12

9. COURSE SYNOPSIS

(a) PGD

MME 701: Structure and Properties of Materials 3 Units

Bonding in Solids-metallic, covalent, ionic, Vander walls bonding; Space Lattice and Crystal Systems; Methods of Studying Crystal Structures X-ray Techniques, electron and neutron diffractions; Imperfections in Crystals vacancies, dislocations; Solid Phases, Allotropy or Polymorphism, Gain Boundaries, Types of Solid Phases; Phase Transformation, Crystal Growth. Solid-Solid Transformations. Electrical Properties; resistance Semiconductors, Metallic Conduction. Superconductivity. Thermoelectric Effects; Magnetic Properties, Atomic Magnetic Domains, Magnetically Soft Materials; Permanent (hard) Magnets; Thermal Properties; Nuclear Properties; Elastic Properties of Engineering Alloys; Elastic Stresses in Design, Plastic Deformation; Deformation at Normal Temperature; High Temperature Deformation; Stress Strain Relations in Plastic Deformation; Fracture; Tests Endurance Tests, High-Temperature Strength, Low- temperature Strength, Wear Resistance; Hard Surfaced Metals, Bearing Materials.

MME 703: Production Metallurgy 3 Units

Metal Forming Methods; Modern Processes of Metal Production for Castings; Casting Principles; Various Types of Casting Sand, Die, Shell Mould, Investment, Full Mould, Centrifugal. Relationship between Structure and Properties of Cast Irons; Melting of Cast Irons in Cupola, Induction and Crucible Furnace. Steel Melting for General casting; Acid Furnaces; Deoxidation and Alloying; Non-ferrous Alloys Melting, CuAl.

MME 705: Mineral Processing 3 Units

Structure and Textures of Minerals and their Significance in Mineral Genesis and Minerals Treatment; Application of Mineralogy to Mineral Technology; Ore Dressing; Basic Comminution Processes crushing, grinding; Sizing Analysis and determination of Mineral Liberation Characteristics; Separation Methods-heavy medium separation gravity separation, magnetic separation, electrical separation, froth floatation; Dewatering; Tailing Disposal; Physical and Mechanical Process of Agglomeration.

MME 704: Engineer In The Society 2 Units

Philosophy of science. History of engineering and technology. Safety in engineering and introduction to risk analysis. The role of engineers in nation building. Invited lectures from Professionals.

Solution; Dispersion Hardening; Application of Phase Diagrams; The Iron Carbon System; Irons, Steel Cast Irons; Properties of Iron Carbon Alloys Brasses, Bronzes; Magnesium Alloys; Titanium Alloys; Impurities in Metals.

MME 706: Extraction And Refining Of Materials I (Iron And Steel Making) 3units

Classification and types of iron ores. Agglomeration techniques. Iron making processing routes viz blast furnace, direct reduction and other current processes. Types of fuels and fluxes used in each process routes. The physical chemistry of iron making in each process and their respective controls. Types of mixers. Material and thermal balances. Steel-making processes. Brief description of various steel making process and their technology and advantages. Raw materials requirement and steel making practices. Thermodynamics and kinetics of steel-making viz: refining of hot metal; dynamics and kinetics of steel-making viz. refining of hot meted iron. Brief description of the advantages and drawback of steel-making processes. Secondary steel making processes and manufacture of alloy steels. Argon purging and ladle alloying and desulphurisation. Principles and technology of slab and ingot casting. Types of casting methods top and bottom pouring moulds; horizontal vertical and radial continuous casting machines Casting defects and their control. Merits and demerits or casting techniques.

MME 722: Corrosion Engineering 3 Units

Electrochemical Corrosion; Electrode Potential; Pousbaix Diagram; Specific Corrosion Types-uniform; crevice, erosion pitting, galvanic, intergranular, selective leaching, stress corrosion cracking, corrosion fatigue, corrosion control techniques.

MME 708: Metallurgical Thermodynamics 3 Units

Stoichiometry; Law of Conservation of Mass, Blast Furnace Charge Balance Calculations, Materials Balance in Smelting Operation, Calorific Value of Fuels, Combustion of Fuels; Work, Heat 1st Law of Thermodynamics, Heat and Work Changes in Reversible Processes, Heat Capacity, Calculation of Enthalpy Changes, Reversible Adiabatic Process, Energy Balances in Simple Systems, Determination of Theoretical Flame Temperature in Blast Furnace Energy. Consumption in Metallurgical Processes.

MME 720: Metallurgical Instrumentation 2 Units

Metallography; Optical Microscopy, Metallurgical Microscope, Special Microscopic Techniques, High-Temperature Metallography; Electron Microscopy, X-ray Metallography, Radiography, X-ray Microanalysis, X-ray Microscopy; Macrostructure Examination of Specimen Surface; Examination of a Macroetched Section, Examination of a Fractured Section, Non-Destructive Testing.

MME:712 Metallurgical Laboratory 2 Units**Experiments on:**

1. Mineral processing (mineralogical analysis, jigging, floatation, etc),
2. Extractive metallurgy (metal leaching, metal precipitation, solvent extraction, etc)
3. Foundry (moulding; melting, casting, etc)
4. Optical metallurgy (specimen preparation, imaging and quantitative analysis, etc)
5. Materials testing. (Hardness, impact, tensile, fatigue, etc)
6. Heat treatment Experiments (Annealing, quenching, normalizing etc.)
7. Corrosion rate measurements.

MME 717: Extraction and Refining of Materials (Non Ferrous Metals) 2 Units

Outline of major competing routes of metal production from their ores. Limitations and factors influencing the choice of production and refining process i.e. the scientific and technological analysis of extraction processes. Ore treatments techniques (roasting, pressure oxidation, bio-oxidation). Thermodynamics and kinetics of hydrometallurgical processes; leaching. Cementation, precipitation, ion exchange and solvent extraction processes.

MME 711: Engineering Mathematics 1 (3 Units)

Review of matrix operation including inversion, Eigen values, Eigen vectors and Canonical transformations and application. Three dimensional vector representations, vector calculus, gradient, divergence and curl line, surface and volume integrals, laplacian operations. Green's Stoke's and

Divergence theorems and applications. Ordinary and partial

differential equations, applications and physical problems

Complex variables, numerical analysis, special functions and integral, problem formulation, simple method of solution.

MME 707: Engineering Drawing 3 Units

Instruments for engineering drawing and their uses, bisection of lines and angles and their applications. Polygon, tangency, locus of simple mechanism. Factorial drawing; isometric, oblique and perspectives. Orthographic projection. Dimensioning and development of simple shapes. Assembly drawing of simple components. Conventional representation of common engineering features. Freehand sketching.

MME 710:Physical Metallurgy I 3 Units

Phase Diagrams; Solid Solution Systems, Solid-solution Freezing, Uses of Solid Solution diagram, Copper- Nickel: A typical Solid Solution System in other Equilibrium Diagrams; Eutectic Systems, Peritectic System; Non-Equilibrium Solidification, Segregation During Normal Freezing; Zone Melting; Intermediate Phases; Solid State Reactions; Eutectoid reactions; Precipitation from Solid Solution; General Hardening Processes; Precipitation Strain; Solid

Principles of electrometallurgy (electrowinning and electrorefining). Fire refining. Extraction and refining of most common commercial metals such as aluminium, copper, lead, zinc nickel, tin, gold etc.

MME 716: Polymer Technology 1 Units

Chemistry polymerization processes-condensation, polymerization. Addition polymerization. Expoxidopolymerization (Fibre glass, carbon fibre materials) synthetic rubbers. Styrene-butadiene rubber. Thermoplastics and thermosetting plastics technology - polymerization system. Molecular weight and melt flow index mould techniques including steam-mould for expanded polystyrene. Compression moulding. Projection moulding, extrusion moulding calendaring solid state forming.

MME 715:Physical Metallurgy 2 Units

Transformation Curves (TTT, CCT diagrams); Equilibrium Structures; Annealing and Normalizing; Spherodising; Process Annealing; Austenite-to- Martensite transformation, Martensitic Structures, Tempering of Martensite; Intermediate Phase, Isothermal Transformation; Effect of Composition; transformation during Cooling; Heat Treatment for Hardening. Quenching; Hardenability; Heat-Treating Methods; Engineering Properties of Heat Treated Steels; Low Carbon steels; Medium-Carbon Steels; High Carbon Steels; Heat Treatment of Non-ferrous Metals Aluminum, alloys, Magnesium, Alloys.

MME 719: Engineering Materials 1units

Ceramics; Types of Ceramics Materials Structures and Bonding Mechanics of Ceramic Materials. Characteristics of Vitreous and Crystalline Inorganic Non-Metals. Applications and discussion of Effects of Microstructure on Thermal, Mechanical, Optical and Electrical properties of Materials.

MME 713: Statistical Methods (2 Units)

Descriptive Statistics: Central tendencies and dispersion. Elementary probability theory, Conditional probability, Baye's theorem, probability distributions and applications. Elementary theories of sampling and estimation. Test of hypothesis and significance. Curve fitting, linear and estimation. Test of hypothesis and significance. Curve fitting, linear and multiple regression analysis; linear correlation, analysis of variance, time series analysis. Statistical quality control for mean, standard deviation, range, number of defects etc. Sampling techniques, average sampling number, stochastic processes.

MME 719: Heat And Mass Transfer (3 Units)

Heat transfer by conduction:One-dimensional heat conduction problems and solution. Fourier's equation using energy conservation approach, steady and unsteady state 2 D heat conduction (Laplace equation, Poisson's equation). Dimensionless variables of heat conduction.
Heat transfer by convection: Basic equations of heat convection. Free and forced convections. Dimensionless

numbers and similarity. (Reynolds, Prandtl, Grashof, Rayleigh, Stanton, Nusselt, Froude's and Görtz numbers). State Buckingham pi theorem, boiling and condensation. Heat transfer radiation: Electromagnetic spectrum, thermal radiation spectrum emissivity, reflectivity, transmissivity, absorptivity, emissive power. Real and ideal surfaces. Total and monochromatic radiation. • State Kirchoff's law, Wien's displacement, Stephan Boltzman's law. Direct exchange between black and grey surfaces, exchange in enclosures with non-participating medium. Heat Exchangers: Functions of heat exchangers. Basic types of heat exchangers. Analysis of heat exchanger using the Logarithmic Mean Temperature Difference (LMTD) and number of transfer units (NTU) methods. Mass transfer: Definition of momentum transfer. Navier-Stokes' equation analysis of boundary layer theory boundary layer thickness, drag, boundary layer control. Flow through conduits and over submerged bodies (flat plates, cylinders and spheres) 30h (T); 45h (P).

MME 718: Introduction To Engineering Materials (2 Units)

Characteristics and manufacturing methods. Composites, ceramics, and steel, steel grades and use or materials; modern engineering materials and materials for special purposes.

MME 724: Numerical Methods Computer Programming (2 Units)

Gaussian elimination, Gauss-Seidel methods are Newton-Raphson methods of solving linear equations. Forward and backward difference tables central difference formula, finite difference solution to practiced differential equations. Solutions of ordinary differential equations (1st and 2nd order) using Runge-Kutta method. Root finding, Algorithms, inputs and output, Basic, FORTRAN and Modern Languages. Computer software analysis, Problems and engineering management.

MME 721: Metals And Materials Process And Plant Design (2 Units)

Design of metallurgical processing system. Method of estimating process cost and profitability performance. Selection and design of process equipment. Integration of Process units into a working plant and its construction and operation. Design of metallurgical equipment: furnace, ball mills, floatation cells, mixers, sintering plants, metal forming mills etc. Management of construction site. Personal management

MME 731: Law Management And Entrepreneurship (3 Units)

Principles of management. Industrial group and organizational behaviour. Motivation. Industrial law, legislation on wages, trademarks and patents, law of contracts and sales of goods. Liability for industrial injuries. Industrial relations. Trade unions, employer associations, wages

bargaining and role of the state. Relevant topics on entrepreneurship designed by the National Universities Commission for Nigerian Universities Isothermal Transformation; Effect of Composition; transformation during Cooling; Heat Treatment for Hardening. Quenching; Hardenability; Heat-Treating Methods; Engineering Properties of Heat Treated Steels; Low Carbon steels; Medium-Carbon Steels; High Carbon Steels; Heat Treatment of Non-ferrous Metals Aluminum, alloys, Magnesium, Alloys.

MME 719:Engineering Materials (1unit)

Ceramics; Types of Ceramics Materials Structures and Bonding Mechanics of Ceramic Materials. Characteristics of Vitreous and Crystalline Inorganic Non-Metals. Applications and discussion of Effects of Microstructure on Thermal, Mechanical, Optical and Electrical properties of Materials.

MME 713: Statistical Methods (2 Units)

Descriptive Statistics: Central tendencies and dispersion. Elementary probability theory, Conditional probability, Baye's theorem, probability distributions and applications. Elementary theories of sampling and estimation. Test of hypothesis and significance. Curve fitting, linear and estimation. Test of hypothesis and significance. Curve fitting, linear and multiple regression analysis; linear correlation, analysis of variance, time series analysis. Statistical quality control for mean, standard deviation, range, number of defects etc. Sampling techniques, average sampling number, stochastic processes.

MME 719: Heat and Mass Transfer (3 Units)

Heat transfer by conduction:One-dimensional heat conduction problems and solution. Fourier's equation using energy conservation approach, steady and unsteady state 2 D heat conduction (Laplace equation, Poisson's equation). Dimensionless variables of heat conduction.

Heat transfer by convection: Basic equations of heat convection. Free and forced convections. Dimensionless numbers and similarity. (Reynolds, Prandtl, Grashof, Rayleigh, Stanton, Nusselt, Froude and Görtz numbers). State Buckingham pi theorem, boiling and condensation. Heat transfer radiation: Electromagnetic spectrum, thermal radiation spectrum emissivity, reflectivity, transmissivity, absorptivity, emissive power. Real and ideal surfaces. Total and monochromatic radiation. • State Kirchoff's law, Wien's displacement, Stephen Boltzman's law. Direct exchange between black and grey surfaces, exchange in enclosures with non-participating medium.

Heat Exchangers: Functions of heat exchangers. Basic types of heat exchangers. Analysis of heat exchanger using the Logarithmic Mean Temperature Difference (LMTD) and number of transfer units (NTU) methods Mass transfer: Definition of momentum transfer. Navier stoke's equation analysis of boundary layer theory boundary layer thickness, drag, boundary layer control. Flow through conduits and over submerged bodies (flat plates, cylinders and spheres) 30h (T); 45h (P).

MME 718: Introduction to Engineering Materials (2 Units)

Characteristics and manufacturing methods. Composites, ceramics, and steel, steel grades and use or materials; modern engineering materials and materials for special purposes.

MME 724: Numerical Methods Computer Programming (2 Units)

Gaussian elimination, Gauss-Seidel methods arc Newton-Raphson Heron methods of solving linear equations. Forward and backward difference tables central difference formula, finite difference solution to practiced differential equations. Solutions of ordinary differential equations (1st and 2nd order) using Runge-Kutta method. Row charting, Algorithms, inputs and output, Basic, FORTRAN and Modern Languages. Computer software analysis, Problems and engineering management.

MME 721: Metals And Materials Process And Plant Design (2 Units)

Design of metallurgical processing system. Method of estimating process cost and profitability performance. Selection and design of process Equipment. Integration of Process units into a working plant and its construction and operation. Design of metallurgical equipment: furnace, ball mills, floatation cells, mixers, sintering plants, metal forming mills e.t.c. Management of construction site. Personal management.

MME 731: Law Management And Entre-preneurship (3 Units)

Principles of management. Industrial group and organizational behaviour. Motivation. Industrial law, legislation on wages, trademarks and patents, law of contracts and sales of goods. Liability for industrial injuries. Industrial relations. Trade unions, employer associations, wages bargaining and role of the state. Relevant topics on entrepreneurship designed by the National Universities Commission for Nigerian Universities. explosive techniques; sintering technology: sizing and impregnating; Heat treatment of component produced by powder metallurgy: powder metallurgical techniques in metal protection and repair of worn and corroded components. Current issues in powder metallurgy from high production to nanomaterials.

MME 828 Advanced Metal Joining Processes (3 Units)

Joining of metals: soldering, brazing welding methods: Thermal, chemical, and mechanical aspects of welding processes. Metallurgical aspects of welding including microstructure and properties of the weld. Welding as a special form of manufacturing process involving solidification. Modern techniques of welding, the classification of different weld zones, their origin and the influence on properties and weld design.

MME 830: Advanced Foundry Technology (3 Units)

Advanced technology of moulding and casting processes: Sand mould, permanent mould, plaster mould, shell mould and CO₂ process: Study of such special casting procedures as sand casting, investment casting, centrifugal casting, die casting, continuous casting, etc. Theoretical approach to these casting procedures. Principles of metal solidification: Metal-casting principles including pattern design: sand testing, risering and gating of castings, casting design, and casting defects. Advanced study of the fundamental sciences as applied to metal casting; ceramics and polymers used in the metal-casting industry, the physical chemistry of liquid metal as applied to melting and refining, fluid flow in molds, and the metallurgical principles affecting the properties of ferrous and nonferrous castings. Quality control and assurance.

MME 832 Advanced Heat Treatment Processes (3 Units)

Review of phase transformation in metals: Theory of heat treatment; Electronic and thermodynamics principles governing the formation of alloy phases: selection of equipment, media, atmosphere and operating conditions. Quenching media characteristics and selection: Heat treatment of cast iron; tool steel; stainless steel and Heat resisting steel. Heat treatment of non-ferrous metals. Nucleation and growth processes in metals with particular reference to austenite formation and decomposition, discontinuous precipitation, particle coarsening, martensitic transformation. Detailed heat treatment of special important commercial materials especially bearing steels, aluminium alloys titanium alloys, nickel based alloys, high strength low alloy steel and stainless steels.

MME 834 Phase Transformation And Experimental Techniques (3 Units)

Nucleation and growth processes. Free energy changes in precipitation. Theories of nucleation and clustering. Heterogeneous nucleation at grain boundaries, stacking faults, dislocation and impurity phases. Precipitation phenomenon-general, localized and cellular precipitation, **structural changes**. Gruiner-Preston zones, intermediate and stable precipitation, and their correlation with property changes. Coherency, order-disorder reactions, coalescence and overaging. Shear transformation, nature and thermodynamics of martensitic transformation, kinetics and crystallographic features of various alloy system, thermal and isothermal transformation. Burst phenomena

theory, production of habit planes, orientation relationship and shape deformation. Advanced microscopic techniques and principles of x-ray neutron diffraction techniques; metallurgical analytical techniques, x-ray spectrometric; application of pyrometry, manometry, thermogravimetry, differential thermal analysis; non-destructive techniques, diffraction methods, scanning probe microscopy, transmission electron microscopy, spectroscopic characterization including x-ray, Auger, electron, secondary ion and Rutherford Backscattering, case studies.

MME 836 Fracture Mechanics And Failure Analysis (3 Units)

Fracture mechanisms and mechanics of solid materials. Topics include: nature of brittle and ductile fracture, macro-phenomena and micro-mechanisms of failure of various materials, mechanisms of fatigue failure: crack nucleation and propagation, Griffith theory, stress field at crack tips, stress intensity factor and fracture toughness, crack opening displacement, energy principle and the J-integral, fracture mechanics in fatigue, da/dN curves and their significance. Analysis of failures: case histories of component failures: Practiced examples of fatigue analysis and fundamentals of non-destructive testing.

MME 838 Advanced Corrosion Engineering (3 Units)

The electrochemical basis of corrosion; chemical and electrochemical equilibria; the reaction is other in, electrode potentials and sign conventions, the Nernst equation; electrochemical equilibrium diagrams for electrode kinetics, corroding and non-corroding electrodes electrode polarization; interaction of anodic.

PROJECT 12 UNITS.

Two semesters of more practical research work under the supervision of an academic staff who is a PhD holder and not below the rank of Lecturer I. The project report must be submitted and an oral examination must be conducted.

(c) PhD**MME 999: DOCTORAL RESEARCH PROJECT**

For candidate who do not posses an M.Eng or M.Sc in Metallurgical and Materials Engineering or whose transcripts indicate deficiencies in some required courses, the department shall prescribe somme courses, which must be offered during the first year of the programme.

LIST OF ACADEMIC STAFF

S/N	NAME	ACADEMIC QUALIFICATIONS	STATUS	AREA OF SPECIALIZATION
1	Prof. J. A Omotoyinbo	M.Sc (Leningrad), PhD (Akure), COREN Regd., MNMS,MMSN	Professor & HOD	Mechanical Metallurgy
2	Prof. John Ade Ajayi	Dip. Mining (Jos), B.Sc. (Ife), M.Sc. (Lagos), PhD (Zaria), COREN Regd., FNSE, MNMS, MNMGS, MNMSE	Professor	Minerals Engineering
3	Prof. J.O. Borode	B.Sc. (Ife), PhD (Strathclyde), FMSN	Professor	Extractive Metallurgy
4	Prof. B.O Adewuyi	M.Sc (Moscow), PhD (Akure), COREN Regd., MNSE, MMSN, MNMS	Professor	Production Metallurgy; Corrosion Engineering; Materials Development
5	Dr. K.K Alaneme	B. Eng (Owerri), M.Eng, PhD, (Akure), COREN Regd., MNSE, MMSN, MNMS	Reader	Physical Metallurgy/Mechanical Behaviour of Materials; Composites
6	Dr. A. Oyetunji	B.Sc (Ife), M.Sc (Lagos), PhD (Akure), COREN Regd., MNSE, MNMS	Reader	Production Metallurgy (Foundry Technology)
7	Dr. D.T. Oloruntoba	B.Eng., M.Eng., PhD (Akure), COREN Regd., MNMS, MMSN	Senior Lecturer	Corrosion Engineering
8	Dr. S.O Seidu	B.Eng. (Akure),PhD (Bucharest)	Senior Lecturer	Production Metallurgy (Foundry Technology)
9	Dr. D. O. Folorunso	B.Sc. (Ife), M.Eng., PhD (Akure)	Senior Lecturer	Advanced Ceramics
10	Dr. I. O Oladele	B.Eng., M.Eng., PhD (Akure), COREN Regd., MNMS, MMSN	Senior Lecturer	Polymer based Composites
11	Dr. (Mrs) O. A Olaseinde	B.Eng., M.Eng., PhD (Wittwaterstrand), COREN Regd., MNMS, MMSN	Senior Lecturer	Corrosion Engineering
12	Dr. F. O Aramide	B.Sc., M.Sc. (Ife), PhD (Akure)	Senior Lecturer	Advanced Ceramics
13	Dr. O. O. Alabi	B.Sc., M.Sc., PhD (ABU)	Lecturer I	Minerals Processing/ Minerals Engineering
14	Dr. O. Olaniran	B.Eng., M.Eng., (Akure), PhD (TUT, Pretoria)	Lecturer I	Advanced Materials
15	Dr. S. Aribi	B.Eng. (Akure), M.Sc. (Lagos), PhD (Leeds)	Lecturer I	Corrosion Engineering
16	Dr. O.O. Daramola	B.Eng., M.Eng., PhD (Akure), COREN Regd., MNMS, MMSN	Lecturer I	Advanced Materials
17	Dr. U. Donatus	B.Eng.(Akure), M.Eng (Akure), PhD (Manchester)	Lecturer I	Welding Engineering

9.2.6 DEPARTMENT OF MINING ENGINEERING (MNE)

AVAILABLE POSTGRADUATE PROGRAMMES

- a Postgraduate Diploma (PGD) in Mining Engineering
- b Masters of Engineering (M. Eng) in Mining Engineering
- c Doctor of Philosophy (Ph. D) in Mining Engineering

AVAILABLE OPTIONS/ SPECIALIZATIONS

- a Masters of Engineering (M. Eng) with specialization in
 - (i) Surface Mining
 - (ii) Underground Mining
 - (iii) Rock Mechanics
 - (iv) Mine Surveying
 - (v) Mine Environment and Safety
 - (vi) Mine Management and Mineral Economics
 - (vii) Mineral Processing
- b Doctor of Philosophy (Ph. D) with specialization in
 - (i) Surface Mining
 - (ii) Underground Mining
 - (iii) Rock Mechanics
 - (iv) Mine Surveying
 - (v) Mine Environment and Safety
 - (vi) Mine Management and Mineral Economics
 - (vii) Mineral Processing

THE POSTGRADUATE DIPLOMA (PGD) PROGRAMME

1.0 Philosophy/Objectives

Some people discovered upon graduation from higher institution that they cannot obtain their desired kind of jobs or that they cannot perform efficiently on their jobs simply because of the academic deficiencies of their education. For instance, a graduate of Higher National Diploma (HND) in Mining Engineering and a Bachelor's degree with Third Class in Mining Engineering may wish to upgrade their academic status in the profession. Such graduates, therefore, desire to correct their academic deficiencies by returning to the University to undertake appropriate short-term education programmes in order to bridge the gap.

This programme will also enable holders of HND and low-grade degree to qualify for professional registration and facilitate the pursuance of Master's Degree after successful completing the PGD programme.

1.1 Admission Requirements

- (i) HND with at least Lower Credit in Mining Engineering.
- (ii) Bachelor of Engineering (B. Eng) in Mining Engineering with 3rd Class degree.

In addition, candidates must satisfy the required university conditions for admission.

1.3 Duration of Programme

The programme is designed to last for four consecutive semesters. The course runs full time i.e. 24 months minimum.

1.4 Requirements For Graduation

Candidates must complete and pass successfully a minimum of 70 units comprising 64 units of courses and 6 units of supervised project.

COURSE OUTLINE

Year One 1st Semester

Course Code	Course Title	L	T	P	Units
MNE 701	Oil and Gas Well Drilling Technology	3	0	0	3
MNE 703	Engineering Mathematics 1	2	0	0	2
MNE 705	Strength of materials	2	0	2	2
MNE 707	Numerical methods and computer program	2	0	0	2
MNE 709	Surface Mining	3	0	0	3
MNE 711	Mineral Processing	2	0	3	3
MNE 713	Mine Surveying	2	0	3	3
TOTAL					18

2nd Semester

Course Code	Title	L	T	P	Units
MNE 702	Technology Policy and Development	2	0	3	2
MNE 704	Mine Design	2	1	0	3
MNE 706	Underground Mining	3	1	0	3
MNE 708	Mineral Economics	3	1	0	3
MNE 710	Mine Management, law & Entrepreneurship	2	0	0	2
MNE 712	Mine Ventilation	2	0	3	3
MNE 714	Engineering Mathematics II	2	0	0	2
TOTAL					18

Year Two 1st Semester

Course Code	Title	L	T	P	Units
MNE 721	Course Seminar	3	0	0	3
MNE 723	Statistics for Engineers	2	0	0	2
MNE 725	Drilling and Blasting	2	0	3	3
MNE 727	Engineer-in-Society	2	0	0	2
MNE 729	Field Work	0	0	9	3
MNE 731	Mine Organization & Planning	3	0	0	3
TOTAL					16

2nd Semester

Course Code	Title	L	T	P	Units
MNE 720	Rock Mechanics	2	0	3	3
MNE 722	Mine Equipment and Machinery	2	0	0	2
MNE 724	Petroleum Reservoir Engineering	3	0	4	3
MNE 726	Mine Construction	2	0	0	2
MNE 728	Mine Reclamation and Environment	2	0	0	2
MNE 799	Project	0	0	18	6
TOTAL					18

COURSE SYNOPSSES

MNE 701 OIL AND GAS DRILLING TECHNOLOGY (3 UNITS)

Modern techniques for oil and gas well drilling. Drilling rigs; equipment, hoisting, drill string, casing and drill bits. Circulating system, drilling, fluids, muds, drilling hydraulics. Well head equipment, drilling and casing programmes. Drilling performance, offshore drilling rigs. Drilling line design consideration, mud engineering, Functions of drilling mud, types and fundamental properties of drilling mud. Rig hydraulics, Casing design, Function and types of casing, Strength specification and loading. Cementing – functions, classes and types of cement, properties of cement slurry, mechanics of cementing. Hole problems. Site visit.

MNE 702 TECHNOLOGY POLICY AND DEVELOPMENT (2 UNITS)

History of Technology and its development, utilization of technology as an economic resource in Nigeria. Science, technological knowledge and productive capacity. Implication for planning in a developing economy. the role of Research and Development to the development of a nation. Scientific infrastructure and structure of science- based industry. Mechanisms of technology transfer. Technology policy-design and implementation Nigeria.

MNE 703 ENGINEERING MATHEMATICS I (2 UNITS)

First and second order differential equation with constant coefficient. Simple treatment of partial differential equation. Lapace transformation. Element of probability and probability distribution. Normal, Poisson, binomial and geometric distributions. Test of Hypothesis, F. distribution, regression, correlation and analysis of variance. Contingency table.

MNE 704 MINE DESIGN(3 UNITS)

Design of surface and underground excavation methods, Design of drilling and blasting methods, Design of Roadways, shaft, ventilation system, drainage system and magazines. Individual student design work to be carried out. Shaft sinking and different methods available. Determination of the width and depth of bench. Calculation of the amount of explosives required for rocks and minerals fragmentation.

MNE 705 STRENGTH OF MATERIALS (2 UNITS)

Study of different type of materials relevant to mining industries: iron, steel, aluminum, ceramic, wood etc. Bending moments and shear force in beam; failure theories in iron, steel, wood and rock, Mohr circle. Type of failure in rock: plane, circular, wedge mode of slope failure. Support systems in surface and underground mines.

MNE 706 UNDERGROUND MINING (3 UNITS)

Detail study of different underground mining methods to include adit, drift, open stopping, Borehole, level etc. The design of typical mining methods for each operations. Cost estimation in production, transportation and scale underground equipment, drainage ventilation and control of subsidence.

MNE 707 NUMERICAL METHOD AND COMPUTER PROGRAM (2 UNITS)

Solution of algebraic and transcendental equations. Curve fitting. Error analysis. Interpolation and approximation. Zero or non-linear equation to one 'variable'. Systems of linear equations. Numerical differentiation and integration equations. Initial value problems for ordinary differential equation. Background materials for linear multi step methods for IVP of ordinary differential equations. Definition reading to basic formula of linear multi step method. Basic theory of linear multi step methods. Derivation of some basic methods. Application of paradigm, excel Microsoft and petrel software.

MNE 708 MINERAL ECONOMICS (3 UNITS)

Role of mineral industries in national development with emphasize on developing countries like Nigeria. Variation in ore grade, non-renewable asset, increases in funding with increase in depth; wealth conservation. Global production and consumption pattern of major mineral commodities. Structures of established mineral market, supply and demand, mineral pricing. Projecting and fire lasting methods, market research, mine legislation and the mineral industry. Public and the mineral act, Mineral disposal system, mineral taxation policy.

MNE 709 SURFACE MINING (3 UNITS)

Introduction to mining, development of mining technology, opening of a mine, stages in the life of a mine, classification of mining techniques, analysis of surface mining operations. Type of surface of mining techniques, similarities and differences; ore estimation, grade control, reserve estimation short and long range planning. Advantages and disadvantages of surface mines. Surface excavation, ore estimate, grade control, short and long range planning unit operations, equipment, case studies of typical surface mines, coal metals and non-metallic mines.

MNE 710: MINE MANAGEMENT, LAW AND ENTREPRENEURSHIP (2 UNITS)

Basic concept of management. Management structure. General principles functions and responsibilities of management under planning, organization directing, controlling and coordinating. Different forms of business organizations and entrepreneurship. Wage systems. Industrial relations. Nigerian mining laws, Acts and Regulation.

MNE 711 MINERAL PROCESSING (3 UNITS)

Ore sampling techniques and communtion theory, Dewatering, Flocculation and dispersion, theory and practice of thickening, Filtration and drying, criteria for selection of grinding and screening equipment for mineral concentration techniques. Selection of mineral concentration techniques. Design, testing and evaluation of mineral beneficiation flow sheets for copper, tin, lead, zinc, iron, gold and other ores of local importance. Material handling method and tailing disposal.

MNE 712 MINE VENTILATION (3 UNITS)

Fundamentals of mine ventilation. Techniques for the control of dust, temperature, humidity, gas. Physiological effects and dangers of poor mine ventilation. Basic principles of mine ventilation design. Simple calculations of flow of air through ducts and mine opening. Equipment selection, instrumentation and air measurements. Evaluation of efficiency of ventilation systems. Testing of refrigeration equipment, test of air-conditioning equipment, lack detection methods: Charging and other service procedures for refrigeration and air-conditioning systems. Trouble shooting. Construction of air ducts.

MINE 713 MINE SURVEY (3 UNITS)

Instrument use in topographical mine survey. The work of mine surveyor during exploration, opening, development and mining. Traversing on surface and underground mines. Orientation of one vertical shaft and two vertical shaft. Different methods of reserve estimation. Leveling work in an underground mine. The use of GPS and GIS.

MNE 714 ENGINEERING MATHEMATICS II (2 UNITS)

Series solutions of second order linear equations. Based, lengendre and hypergeometric equations and functions. Gamma, Beta functions, sturm-liovelle problems. Orthogonal polynomials and functions. Former, /Formier bessel and Formier – Legendre series. Four transformation. Solution of laplace, ware and heat equations by Fourier methods.

MNE 720 ROCK MECHANICS (3 UNITS)

Rock strength and failure criteria. Common laboratory strength tests: Uniaxial, Triaxial, Brazilian, Flexural tests, stress - strain behaviour in compression. The Mohr-Columb failure criterion, the effect of water, the influence of the principal/stress ratio on failure. Empirical criterion of failure. Elastic properties. Application of rocks mechanics in engineering or underground openings. Rock slope stability, support systems, design and selection - caving and subsidence.

MNE 721 COURSE SEMINAR (3 UNITS)

Review of literature in the area of Mining Engineering. Students write up will be supervised and graded by assigned

lecturer for score up to 40 while the seminar is 60, making a total of 100.

MNE 722 MINE EQUIPMENT AND MACHINERY (2 UNITS)

Pumps and their characteristics. Excavators e.g draglines bucket excavators. Dredges and coal cutter and their uses. Selection of support systems in long wall faces. Different type of transport machines, such as belt conveyor, roadways, railways, rope and aerial transport system . Hoisting machine. Coal cutters and their uses.

MNE 723 STATISTIC FOR ENGINEERS (2 UNITS)

Elements of probability and probability distribution; normal, binomial, poison, geometric, Negative binomial distributions. Estimation and tests of hypothesis concerning the parameters of distribution. Regression, correlation and analysis of variance contingency table. Non-parametric inference. Subjection of Data to Bar chart, Polygon, Pie chart, and Histogram. Basic sampling methods Stratification. Use of auxiliary mean and total in simple and in stratified random sampling. Methods of social investigation; design of surveys, errors and bias, methods of collection of data, processing analysis and interpretation.

MNE 724 PETROLEUM RESEVOIR ENGINEERING (3 UNITS)

Introduction to hydrocarbon reservoir. Rock and fluid properties. Mechanics of fluid flow in porous media. Reservoir drive mechanism. Composition of petroleum, material balance applied to oil reservoirs. Introduction to enhanced oil recovery methods. Well completions. Well tests, production tests, and routing tests, steady and unsteady flow equations. Engineering and routing tests, pressure build-up survey, well flow monitoring and measurement. Well simulation.

MNE 725 DRILLING AND BLASTING (3 UNITS)

Classification of drilling and penetration methods. Theories of rock penetration, Basic parameter affected bench drilling i.e. height, burden, spacing and drilling pattern. Choice of drilling equipment. Type of Explosive: Black powder as low explosive, Ammonium Nitrate explosive like dynamite, military explosives, Blasting methods, Explosive Accessories and construction of magazines. Blasting pattern and disturbance created by blasting

MNE 726 MINE CONSTRUCTION (2 UNITS)

Factors affecting the siting of shafts, adits etc. Shaft sinking, tunneling and construction of roadways, drifts, headings etc. Drainage systems in surface and underground mines. Different support methods e.g wood, steel, and concrete. Selection of a suitable support system in a mine.

MNE 727 ENGINEER-IN-SOCIETY (2 UNITS)

Philosophy of science. History of engineering and technology.

Engineering professions and specializations. Engineering Draftsmanship. Engineering training, institutions and post-training capacity building. Safety in engineering and introduction to risk analysis. The role of engineers in nation building. - NSE, COREN, COMEG, NMGS

MNE 728 MINE RECLAMATION & ENVIRONMENT (2 UNITS)

Stripping ratio determination: overburden and ore characteristics, strength of overburden and ore. Venn and massive type of ore in underground mines. Type of entry of underground mines; method of entry. Adit, shaft etc. Underground ore reserve estimation methods, planning and development of underground mine opening. Advantages and disadvantages of underground mines.

MNE 729 FIELD WORK (3 UNITS)

This is an intensive field work designed to expose the students to most of the rudiments of the mining engineering profession. It is a practical exposure covering mine survey, geometrical mapping of mineral deposits, mining methods, geotechnical investigation,

mineral processing. The field work is carried out at such relevant places as existing mining operations (surface and underground), processing and smelting plants, unexploited mineral deposits, petroleum and gas facilities and other relevant places. The fieldwork is designed for a period of four weeks commencing at the end of Course work. The students are required to prepare a technical report of the entire field work and present a seminar on the field programme. The field work is thereafter assessed for grading

MNE 731 MINE ORGANIZATION AND PLANNING (3 UNITS)

Basic concepts. Routing planning of mining works, Drilling and blasting, extraction, coding haulage and waste disposal. Use of organization network in mine planning and design. Planning of development work e.g construction of drift and headings. Technical economical indices required during mine design.

MNE 799 PROJECT (6 UNITS)

The student prepares a project report in the final year of study on a selected and approved research project in any aspect of the discipline. The student is expected to plan and carry out an investigation on a project under the supervision of a member of staff. The project shall be assessed by the project supervisor and the External Examiner.

MASTER OF ENGINEERING (M.ENG) PROGRAMME IN MINING ENGINEERING.

2.0 Philosophy/Objectives

The programmes are designed to produce specialists in all specialized fields of Mining Engineering who will meet the

complex technical and management challenges of the mineral industry. These specialists will in addition serve as a pool for manpower requirements for academic and research institutions.

2.1 Admission Requirements

Requirements for admission into the Master of Engineering degree programme in Mining Engineering are as outlined by the Board of Postgraduate Studies, and include:

- (I) In addition to the general regulations and guidelines on admission, first degree graduate of the Federal University of Technology, Akure or other recognized Universities in Mining Engineering with a minimum of second class lower division.
- (ii) Higher National Diploma in Mining Engineering with minimum of lower credit pass
- (iii) Plus a Postgraduate Diploma in Mining Engineering with a minimum of upper credit.

2.2 Duration of Programme

Full- Time 18 months. Senate may approve an extension where necessary

2.3 Requirements for Graduation:

Candidates must complete and pass a minimum of 39 units comprising 27 units of courses and 12 units of Master's Dissertation.

2.4 COURSE OUTLINE

First Semester

A. Surface Mining Option

COURSE CODE	TITLE	L	T	P	U
MNE 803	Data Base Design and Analysis of Experiment	2	0	3	3
MNE 809	Techniques/Mechanization of Surface Mines	2	0	3	3
MNE 811	Mine transport	3	0	0	3
MNE 815	Mine Environment and Land Reclamation	3	0	0	3
MNE 837	Research Methodology	3	0	0	3
Total				15	

B. Underground Mining Option

COURSE CODE	TITLE	L	T	P	U
MNE 803	Data Base Design and Analysis of Experiment	2	0	3	3
MNE 805	Structure/Construction of Underground Mines & Tunnels	3	0	0	3
MNE 807	Geostatistics	3	0	0	3
MNE 809	Techniques/Mechanization of Surface Mines	2	0	3	3
MNE 811	Mine Transport	3	0	0	3
MNE 837	Research Methodology	3	0	0	3
Total				18	

C. Rock Mechanics Option

COURSE CODE	TITLE	L	T	P	U
MNE 803	Database Design and Analysis of Experiment	2	0	3	3
MNE 805	Structure/Construction in Underground Mines & Tunnels	3	0	0	3
MNE 817	Applied Rocks Mechanics	2	0	3	3
MNE 835	Finite Element Methods	3	0	0	3
MNE 837	Research Methodology	3	0	0	3
Total				15	

D. Mine Surveying Option

COURSE CODE	TITLE	L	T	P	U
MNE803	Data Base Design and Analysis of Experiment	2	0	3	3
MNE805	Structure/Construction of Underground Mines & Tunnels	3	0	0	3
MNE807	Geostatistics	3	0	0	3

MNE827	Mine Surveying I	2	0	3	3
MNE837	Research Methodology	3	0	0	3
	Total				15

E. Mine Environment and Safety Option

COURSE CODE	TITLE	L	T	P	U
MNE803	Data Base Design and Analysis of Experiment	2	0	3	3
MNE813	Mineral and Metallurgical Plant Design	2	0	3	3
MNE815	Mine Environment and Land Reclamation	3	0	3	3
MNE821	Groundwater Hydrology	3	0	0	3
MNE837	Research Methodology	3	0	0	3
	Total				15

F. Mine Management and Mineral Economics Option

COURSE CODE	TITLE	L	T	P	U
MNE801	Management Information System	3	0	0	3
MNE803	Data Base Design and Analysis of Experiment	2	0	3	3
MNE809	Techniques/Mechanization of Surface Mines	2	0	3	3
MNE823	Operations Planning & Management	3	0	0	3
MNE825	Economics of Mining	3	0	0	3
MNE837	Research Methodology	3	0	0	3
	Total				18

G. Mineral Processing Option

COURSE CODE	TITLE	L	T	P	U
MNE 803	Data Base Design and Analysis of Experiment	2	0	3	3

MNE 805	Structure/Construction of Underground Mines & Tunnels	3	0	0	3
MNE 809	Techniques/Mechanization of Surface Mines	2	0	3	3
MNE 811	Mine Transport	3	0	0	3
MNE 813	Mineral and Metallurgical Plant Design	2	0	3	3
MNE 829	Advanced Applications of Comminution and Ancillary Operations	2	1	2	3
MNE 837	Research Methodology	3	0	0	3
	Total				21

Second Semester

A. Surface Mining Option

COURSE CODE	TITLE	L	T	P	U
MNE 806	Applied Explosives Engineering	3	0	0	3
MNE 808	Rock Slope Engineering	3	0	0	3
MNE 814	Pollution Control Engineering	3	0	0	3
MNE 820	Mine Planning and Organization	3	0	0	3
	Total				12

B. Underground Mining Option

COURSE CODE	TITLE	L	T	P	U
MNE802	Applied Mine Ventilation	3	0	0	3
MNE 806	Applied Explosives Engineering	3	0	0	3
MNE 812	Roof and Ground Control Engineering	3	0	0	3
MNE 816	Mine Surveying II	3	0	0	3
MNE 818	Design of Underground Mines and Tunnels	3	0	0	3
	Total				15

C. Rock Mechanics Option

COURSE CODE	TITLE	L	T	P	U
MNE806	Applied Explosives Engineering	3	0	0	3
MNE808	Rock Slope Engineering	3	0	0	3
MNE812	Roof and Ground Control Engineering	3	0	0	3
MNE814	Pollution Control Engineering	3	0	0	3
	Total				12

D. Mine Surveying Option

COURSE CODE	TITLE	L	T	P	U
MNE816	Mine surveying	3	0	0	3
MNE820	Mine Planning and Organization	3	0	0	3
MNE824	Photogrammetry	3	0	0	3
MNE834	Advanced Mineral Economics	3	0	0	3
	Total				12

E. Mine Environment and Safety Option

COURSE CODE	TITLE	L	T	P	U
MNE806	Applied Explosives Engineering	3	0	0	3
MNE812	Roof and Ground	3	0	0	3
MNE814	Pollution Control Engineering	3	0	0	3
MNE820	Mine Planning and Organization	3	0	0	3
MNE828	Health and Safety Law in Mining Industry	3	0	0	3
	Total				15

F. Mine Management and Mineral Economics Option

COURSE CODE	TITLE	L	T	P	U
MNE818	Design of Underground Mines and Tunnels	3	0	0	3
MNE828	Health and Safety Law in Mining Industry	3	0	0	3
MNE830	Course Seminar	3	0	0	3
MNE832	Managerial Economics	3	0	0	3
MNE834	Advanced Mineral Economics	3	0	0	3
	Total				15

G. Mineral Processing Option

COURSE CODE	TITLE	L	T	P	U
MNE814	Pollution Control Engineering	3	0	0	3
MNE820	Mine Planning and Organization	3	0	0	3
MNE834	Advanced Mineral Economics	3	0	0	3
MNE838	Advanced Applications of Mineral Processing Techniques	2	0	3	3
	Total				12

COURSE CODE	TITLE	L	T	P	U
MNE899	Master's Research Thesis	0	0	0	12
	Total				12

COURSE SYNOPSSES

MNE 801: Management Information System (3 Units)

A formal approach to the concept, design and implementation of computer-based management information system (MIS), systems programming, database design and management techniques. Application to the solid mineral including selected Mining industry based software.

MNE 802: Applied Mine Ventilation (3 Units)

Review of some elementary thermodynamics and

psychrometrics. Airflow through roadways and ducts. Mechanical ventilation equipment. Natural ventilation, network, instruments. Ventilation surveys. Ventilation planning and economics.

MNE 803:Data Base Design & Analysis Of Experiment (3 Units)

Files, computation on data base, Hierarchical view of data, descriptions, binding, classification of operating systems, applications. Data base structures; models semantics of relations, operations on models, design of data models (e.g. Hierarchical relational network) scheme protection, data base operation and management.

MNE 805: Structure/ Construction of Underground Mines and Tunnels (3 Units)

General construction parameters: Geological, physical, regulatory and operational parameters. Selection of tunneling machinery. Development and construction of underground mine openings: Shafts, ramps, raises, ore passes, drifts, cross-cuts etc, using drilling and blasting methods. Construction of horizontal and incline mining galleries, shaft station and chambers using blasting methods and tunneling machines. Development and construction of drives and tunnels using drilling and blasting methods, Full-face tunnel borers [TBM], roadheaders and impact hammers, etc.

MNE 806: Applied Explosive Engineering (3 Units)

Explosives and materials for their preparation. Classification of explosives. Manufacturing processes in explosives technology. Uses of explosives. Application of explosives in the extractive industry: solid mineral exploration, search for oil and gas, engineering construction, geotechnics surveying, surface and underground mineral exploitation, wastes disposal etc. Explosives storage and construction of magazines. Transportation of explosive materials. Regulations governing possession, production and distribution of explosives. The role of the Federal Ministry of Mines Steel and Solid Minerals Development and other relevant government agencies in the regulation of explosives.

MNE 807:Geostatistic (3 Units)

Introduction to application and theory of geo-statistics in mining industry. Review of elementary statistics and traditional ore reserve calculation techniques. Concept of geostatistics. Regionalised variables, design of sampling programs, variogram; semivariogram; volume variance relationship; valuation of ore blocks. Kriging, geostatistics estimation of mineral deposit. Presentation of fundamental geo-statistical concepts, including Variogram, estimation variance block variance, kriging, geo-statistical simulation. Emphasis on the practical aspects of geo-statistical modelling in mining. stochastic simulation with Gaussian, indicator, and annealing-based methods. Important subjects such as uncertainty quantification, volume-variance relations, and modelling multiple variables will also be addressed. Formulation of models of engineering problems and industrial systems for

experimentation using a general-purpose simulation language. Statistical and operational validation of simulation results.

MNE 808:Rock Slope Engineering (3 Units)

Understand the concept of stability in Mines. Factors contributing to rock slope failures, Planning slope stability investigation. Classification of slope instabilities, Basic mechanics of slope failures, geotechnical data collection and evaluation, analysis of different types of failures. Circular, Plane, wedge and toppling.

MNE809:Techniques/Mechanization of Surface Mines (3 Units)

Surface mine planning, Basic bench geometry, ore access, pit expansion process, pit slope geometry, final pit slope angles, plan representation of bench geometry, road design and construction, stripping ratios, basic concept of pit limits. Equipment selection-shovel loading, haulage trucks. Machine availability and utilization

MNE 811 :Mine Transport (3 Units)

General analyses of type and mode of transportation in the mining industries, and there classification. Conveyor transport, parameters, design and selection. Rail transport system. Automobile transport system. Auxiliary transport. Design of transport system in the mining industry.

MNE 812: Roof and Ground Control Engineering (3 Units)

State of equilibrium in underground rock masses. Studies of the behaviours of rock mass in transition from one state to another. Problems of roof and ground control. Structural analyses of underground mines. Roof and ground designs and their constraints. Types and mechanisms of ground control failures. Rock fall fatalities. Pillar loading and evaluation. Stress distribution within pillars. Vertical and horizontal underground stresses determination. Factor of safety of roof and ground support. Monitoring rock movement using borehole extensometers, inclinometers and tiltmeters. Current trends in roof and ground control instrumentation.

MNE 813:Mineral and Metallurgical Plant Design (3 Units)

Advanced Principles of Mineral and Metallurgical Plant Design, Problems of Plant Design, location, safety. Detailed equipment procurement procedure. Design of disposal areas, demand tanks, pipes, costs estimating. Identification of materials for Mill construction, foundations framework, walls roof, windows, floors and painting. Practical Design. Case studies of mineral processing plants. Rolling mills steel mills and coal treatment plants.

MNE 814 :Pollution Control Engineering (3 Units)

An overview of the earth and its environment. Advanced topics in stream pollution. Acid mine drainage (AMD), Effect of mineral processing pollution on rivers, wild life etc. Advanced topics on air pollution. Effect of pollutions on the environment. Case studies. Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Salient features of Nigeria legislations on management of hazardous wastes and fly ash; Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Waste Characterisation and reduction of source generation: Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes – Recycling and reuse – Waste exchange; Storage, Collection , Disposal and Transport of Waste: Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection system-Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport. Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills.

MNE 815: Mine Environment And Land Reclamation (3 Units)

Land as a resource. Types and sources of land disturbance and dereliction. Derelict land survey. Environmental quality; environmental audit and impact assessment. Assessment of mine and mill waste. Impacts of mining on microbial organism. Reclamation techniques. Restoration of reclaimed land. The establishment, management and maintenance of self-sustaining natural vegetation of degraded land.

MNE 816 :Mine Surveying II (3 Units)

Mine Surveying in surface mining system: Concept; Surveying work in opening and development of surface mine; Mine Surveying work in construction of highway, haulage, drainage systems in a surface mine. Estimation of mineral reserves. Errors and their adjustments; measures of precision, uses of the terms standard error and standard deviation, rejection of doubtful observations, weighted observations confidence intervals, propagation of systematic errors; propagation of standard or random errors, adjustment by method of least squares.

MNE 817:Applied Rock Mechanics (3 Units)

Rock as a material. Stress energy concepts in rock mechanics. Concepts of shear and triaxial strengths in discontinuous rock media. Analysis of stress and infinitesimal strain, friction, elasticity and strength of rock. Linear plasticity. The state of stress underground. Examination of the various stability analysis methods for rock slopes and underground excavations. Underground measurements, laboratory testing. Mining and other engineering applications.

MNE 818 :Design of Underground Mines and Tunnels (3 Units)

Review of failure processes in rocks. Design criteria: stability and functional requirements. Excavation design methods: Analytical methods – Kirsch Equation, Empirical methods: Rock mass classification system - Terzaghi's rock mass classification system, Rock quality designation RQD, Lauffer's rockmass classification system, Geomechanics rockmass rating system RMR, Mining rockmass classification system, NGI Q classification system. Geological strength index GSI. Stability graph method. Numerical simulation methods - Introduction to various numerical techniques (boundary element, finite element and finite deference.) with examples using some case studies. Design of underground structures in different rock types - Swelling and squeezing rocks; Rock burst prone rocks.

MNE 820:Mine Planning and Organization (3 Units)

Basic concepts: Management as a function of mine planning and organization. Routing planning of mining works: drilling and blasting, extraction-loading, haulage and waste disposal, preventive maintenance schedules for equipment, schedules for work to be done on mine faces; and weekly-daily programs. Organization of technological work schedule in mining. Use of organization loop in mine planning and organization.

MNE821:Groundwater Hydrology (3 Units)

The hydrologic cycle. Flow through porous media, equation of flow and the continuum theorem. Groundwater aquifers/reservoirs as sources of water for mining, processing and other industrial operations. Characteristics of aquifers and geological factors that influence them. Groundwater modeling and flow simulation. Application of statistical methods in hydrological data analyses. Groundwater and well engineering – well sinking, borehole data collection, analyses and pumping tests. Saline water intrusion and coastal hydraulics. Groundwater resources and basins of Nigeria. Groundwater system recharge, run off and flooding/flood control. Hydrological mapping and its applications.

MNE824: Photogrammetry (3 Units)

Principles of photogrammetry. Types of photogrammetry: terrestrial and aerial. Ground photo theodolite. Determination of point (station) co-ordinates and spot level using ground phototheodolite. Air survey cameras. Air photographs; scale of a photograph; distortion of air photograph; stereoscopic pairs; stereoscopy, flight planning. Control and uncontrol (mosaic radial assumption; plotting from air photographs – radial line plotter, principal-point radial line plotting, reduction to scale, slotted template, heighting, parallax bar or stereometer. Airborne profile recorder plotting machines, uses of air photography, application of air photograph in the numerical industry.

MNE 825:Economies of Mining (3 Units)

The fundamental factors critical to the evaluation of a mineral deposit. Evaluation of objectives. Selection of capacity and cut-off grade, operating and capital costs, profitability, risks and reform on mining investment, forecasting and production planning for equipment utilization, drilling and blasting.

MNE 827: Mine Surveying I (3 Units)

Mine surveying works in underground mine: basic principles of underground surveying; system co-ordinate of mine surveying plan. Mine surveying work on driving mining works: Understanding of Mine Survey work in contact with various mining face. Mine survey work in opening and development of underground mining work. Application of remote sensing and GPS in mine surveying. Mine surveying plans and map of underground mining works: Projection of horizontal/vertical profile on strike and dip of underground mineral layer.

MNE 828: Health And Safety Law In Mining Industry (3 Units)

General safety in the Mining industry. Safety during charging and blasting operations. Safety during surface and underground operations. Safety during shaft sinking and construction of mining galleries. Safety during the transportation of materials and exploited minerals. Safety during the use of pneumatic and electrical energies. Gas explosion and rock burst in mines-causes and control. Endogenic and endothermic fires-causes and control. Safety during the use of mine equipment and machineries. Introduction to Accident Prevention and Health & Safety in Industry: Terminology. Accident statistics and trends in mining industry; Safety Risk in Open Cast and Underground Mines; Risk Assessment: Concepts, Qualitative and Quantitative Approaches; Components of Risk Assessment: Risk Identification, Risk Estimation and Evaluation; Risk Analysis using FTA, HAZOP, ETA etc.; Risk Analysis Softwares; Health Risk Assessment and Epidemiological Studies; Statistical and Economic Analysis of Accident Data; Risk Minimization Techniques in Mines; Generic approach to loss control within mining operations; Safety Policies, Safety Audit and Safety Management in Mines; Application of Virtual Reality for Safety, Training and Marketing; Case studies on Safety Risk Assessment in Mining and allied industries

MNE 829:Advanced Applications of Communion and Ancillary Operations in Mineral Processing (3 Units)

Communion theory and mineral liberation process. Selection principles for comminution equipment. Particle classification, size analysis and size classification equipment selection. Dewatering in mineral processing plants. Transportation, feeding and conveying within the mineral processing plant (the belt conveyor, pipelines, pumps - slurry pumps, slurry lines, pump boxes and launders). Practical experiments in comminution and dewatering. Drying and storage equipment – dryers, stackers, reclaimers etc. Tailings and Wastes handling. Design of comminution and material handling

Circuits. Equipment design principles.

MNE 830:Course Seminar (3 Units)

Each student in the Master of Engineering Programme of the Department shall select an appropriate topic in any area of mining engineering and develops this for presentation as seminar. The mode of presentation shall be in Microsoft PowerPoint. Results of any programmes written, drawings, charts and tables shall be imported to the PowerPoint document from the programme document in form of screen print, bitmap or active simulation. The seminar shall be held in the third week after the mid-semester break for the second semester of the session.

MNE 834:Advanced Mineral Economics (3 Units)

Factors critical to the evaluation of mineral deposit. Selection of capacity and cut off grade, operating and capital cost, profitability. Risk in the Time Value of money, investment valuation, quantitative analysis of capital investment as alternative for economic decision – making. Government policy and the mineral industry. Mineral industries analyses.

MNE 835:Finite Element Method (3 Units)

Calculus of variation: Hamilton's principles. Lagrange's equations and geodesic problems. Variational formulation of boundary and initial value problems. Integral transforms: Laplace, Fourier and Hankel transforms. Complex variable methods. Convolution theorems. Application to solution of differential equations. Integral equation: Methods of successive approximation. Integral equation with symmetric kernels, Fredholm alternatives.

MNE 837:RESEARCH METHODOLOGY (3 UNITS)

Overview of types of research. Formulation of research question/objective. Literature survey. Development of appropriate research methodology. Design modes and sampling techniques. Data presentation method and analysis – statistical analysis etc. Writing research report and writing of a good research proposal

MNE838: Advanced Application Of Mineral Separation Techniques (3 Units)

Mechanics of fluid in mineral separation. Classification of separation processes: solid – solid separation, Solid - liquid separation (Gravity, Heavy Media, Centrifugal classification, electrical method, magnetic separation etc). Hydrometallurgical separation processes. Advanced application of separation processes. Process selection for the recovery of some minerals. Equipment selection, sizing and proportioning in mineral separation. Sampling and sampling equipment. Process equipment selection, design and application.

MNE 899: MASTER'S RESEARCH THESIS (12 UNITS)

Students will carry out original research on approved topics

in areas of their programme options. The research, which outcome should contribute to knowledge, could be investigative, basic or applied and is expected to be directed at solving an identified problem related to minerals industry. The student will carry out the research thesis, supervised by approved postgraduate lecturers and successfully defend same in accordance with the regulations of the School of Postgraduate Studies. The format for submission of thesis based on such research shall be in conformity with guidelines laid down by the School of Postgraduate Studies.

DOCTOR OF PHILOSOPHY (Ph. D) PROGRAMME

Degree Option: Doctor of Engineering (Ph.D) in Mining Engineering

3.0 Philosophy/Objectives

The programmes are designed to produce specialists in all specialized fields of Mining Engineering who will meet the complex technical and management challenges of the mineral industry. These specialists will in addition serve as a pool for manpower requirements for academic and research institutions.

3.1 Admission Requirements

To be eligible for admission in the Ph.D programme, candidates are required to hold a Masters degree in Mining Engineering of the Federal University of Technology, Akure or from any other University as approved by the University senate with a CGPA of not less than 3.50 and a grade of not less than 60% in thesis examination.

3.2 Duration of Programme

Full-Time 36 Months

Part-time 48 Months

Senate may approve an extension where necessary.

3.3 Requirements for Graduation:

All candidates are expected to carry out original research theses, supervised by

approved postgraduate lecturers and successfully defend same in accordance with postgraduate school regulations. The format for submission of thesis based on

such research shall be in conformity with guidelines laid down by the School of Postgraduate Studies.

Candidate is expected to carry out original independent research thesis in an area of specialization in mining engineering, supervised by approved postgraduate lecturers. The research, which outcome should contribute to knowledge, could be investigative, basic or applied and is expected to be directed at solving an identified problem related to minerals industry. The student is expected to successfully present Pre-field Proposal Seminar, Progress Seminar and Progress Seminar Final and Thesis for examination in accordance with the regulations of the School of Postgraduate Studies. The format for submission of thesis based on such research shall be in conformity with guidelines laid down by the School of Postgraduate Studies.

ACADEMIC STAFF LIST

S/N	NAME	QUALIFICATIONS	STATUS	AREA OF SPECIALIZATION
1.	Engr. Prof. B.M. Olaleye	PGD, M.Eng., Ph.D (Akure)	Professor /HOD	Rock Mechanics
2.	Engr. Prof. Z.O. Opafunso	M.Sc. (Rapid City, SD), MBA (Vermillion, SD), Ph.D (Akure)	Professor	Surface Mining, Mine Management and Mineral Economics
3.	Engr. Dr. E. O. Ajaka	B.Eng., M.Eng., Ph.D (Akure)	Reader	Mineral Processing and Mineral Processing Plant Design.
4.	Engr. Dr. B. Adebayo	B.Eng., M.Eng., Ph.D (Akure)	Reader	Surface Mining and Drilling Engineering
5.	Engr. Dr. R. A. Osemenam	M.Sc, Ph.D (Moscow)	Senior Lecturer	Mine Surveying and Photogrammetry
6.	Engr. Dr. M. A. Saliu	B.Eng, M.Eng (Akure), Ph.D (Exeter)	Senior Lecturer	Rock Mechanics and Surface Mining
7.	Engr. Dr. T. B. Afeni	B.Eng. M.Eng (Akure), Ph.D (Witwatersrand)	Senior Lecturer	Mine Surveying, and Photogrammetry
8.	Engr. Dr. (Mrs) M.M. Melodi	M.Sc. (Russia), Ph.D. (Akure)	Senior Lecturer	Mine Management and Mineral Economics
9.	Engr. Dr. Engr. M. A. Idris	B.Eng, M.Eng (Akure), Ph.D (Lulea).	Lecturer I	Surface Mining and Slope Stability Analysis
10.	Engr. Dr. V.A Akinbinu	B.Eng, M.Eng (Akure), Ph.D (Witwatersrand)	Lecturer I	Surface Mining and Mine Environments
11.	Engr. Dr. G. O Oniyide	B.Eng, M.Eng (Akure), Ph.D (Witwatersrand)	Lecturer I	Surface Mining

9.3.1. DEPARTMENT OF ARCHITECTURE (ARC)**1. POSTGRADUATE DIPLOMA IN ARCHITECTURE (PGD Arch)****PHILOSOPHY AND OBJECTIVES OF THE PROGRAMME**

The Postgraduate Diploma Programme is design to:

- i. Assist those wishing to make up their deficiencies in their first degree especially to be able to pursue second/higher degree programme.
- ii. Bridge the gap between the Higher National Diploma and first degree in Architecture in order to allow HND holder to pursue higher degree programme.
- iii. Assist candidates to acquire the knowledge required to get exemption from the professional NIA first part 1 examination.
- iv. Provide an opportunity for advanced knowledge in Architecture for those in practice without going through formal degree programme.

ADMISSION REQUIREMENTS

Candidates for admission to the programmes should possess any of the following qualifications:

- B. Tech or equivalent in Architecture.
- HND (upper credit and above) in Architecture from a recognized Polytechnic or College of Technology.
- HND (lower credit) in Architecture with at least 3 years relevant post-qualification experience.

PROGRAMME DURATION

The program shall be full-time for 4 semesters.

REQUIREMENT FOR GRADUATION

Candidates must complete a total of 48 units which consists of 30 units, of course work and 18 units of project work. The project work which spans over the two semesters will be supervised by academic members of staff and project report shall be assessed by a panel of examiners doing an oral examination.

P

PGD**First Semester (Full Time)**

Course Code	Course Title	L	T	P	U
ARC 701	Architectural Design (Mass Housing)	1	0	6	3
ARC 705	Bahavioural Architecture	2	0	0	2
ARC 707	Landscape Theory and Design	1	0	3	2
ARC 709	History of Western Architecture	2	0	0	2
ARC 711	Building Structures (Reinforced Concrete Design)	2	0	0	3
TOTAL					12

Second Semester (Full Time)

Course Code	Course Title	L	T	P	U
ARC 702	Architectural Design (Institutional & Complex)	1	0	6	3
ARC 704	Urban Renewal Theory and Design	1	1	0	2
ARC 706	Construction Detailing	2	0	3	3
ARC 712	Building Law	2	0	0	2
ARC 714	Building Structure (Steel/Timber Design)	2	1	0	3
TOTAL					13

Third Semester (Full Time)

Course Code	Course Title	L	T	P	U
ARC 703	Housing Seminar	2	0	0	2
ARC 713	Interior Design	1	0	3	2
ARC 715	Comparative Studies of Built Form	2	0	0	3
ARC 799	Architectural Design-Research Project 1	1	1	12	12
TOTAL					19

Fourth Semester (Full Time)

Course Code	Course Title	L	T	P	U
ARC 708	Building Economics	2	1	0	3
ARC 710	Modern Movements in Architecture	2	0	0	2
ARC 799	Architectural Design Project II	0	0	36	12
TOTAL				17	

COURSE DESCRIPTION

ARC 701: Architectural Design (Mass Housing & Institutional & Complex) 1-1-12 6 Units

The design studio for the semester is the first Mass Housing Scheme, which involves the study of the housing situation in a chosen Nigeria city and the submission of a design proposal. The proposal should take cognizance of the dearth of housing stocks and the poor quality of existing ones. Furthermore the paucity of financial and material resources of the vast majority of the Nigerian populace makes multi-family housing approach expedient. In the second semester, the design studio focuses in Institutional and Complex projects.

ARC 702: Architectural Design Project I 1-1-12 (6 Units)

The semester will concentrate on the choice of Thesis topic, Identification of scope, data collection, case studies and so on. Students are expected to defend their chosen topic before a panel of jurors.

ARC 799A: Architectural Design Research Project I (12 Units)

The semester will concentrate on the choice of Thesis topic, Identification of scope, data collection, case studies and so on. Students are expected to defend their chosen topic before a panel of jurors.

ARC 799B: Architectural Design Project II 2-2-24

This is the continuation of the final design project for the Post Graduate Diploma Programme. It can be selected from the student's area of interest in Architecture, subject to the approval of the Department.

ARC 703: Housing Seminar 2 Units

The phenomenon of squatter settlements in developing nations. Urban population growth and the demand for shelter, Rapid urbanization and the poverty of the communities. Discussions will explore the solutions to housing problems in developing nations in particular and critically appraise modern

technology and the adoption of alternative technology systems in housing construction.

ARC 704: Urban Renewal Theory and Design (2 Units)

Definition and theme of Urban Renewal. Historical perspectives and contemporary crisis. Urban Renewal as a technique for improving living conditions. Cost and benefits of urban renewal management and social justice considerations. Local case studies of urban renewal schemes.

ARC 705 : Behavioural Architecture 2-0-0 (2 Units)

The investigation of behavioral models that have been applied to design by other disciplines such as anthropology, psychology and sociology. Using photographic and drawing tools, exercises in how architectural elements and settings offer support for human activity and behavior through cultural interpretation.

ARC 706: Construction Detailing 3 Units

Medium to high-rise buildings in framed concrete or steel structures. Emphasis is on integration of structural, mechanical and lighting systems. Fire-fighting in buildings and precautionary measures. Sound control and sound insulation in buildings. Inter-relation of technological choices and design, structure in architecture. The challenge of space enclosures and spanning the relation to architecture form in history. Basic modes of force transfer and corresponding elements of structural form. Discussion of physical, structural and form characteristics of a wide variety of structural types such as cables, membrane, shells, arches, domes trusses, folded plates, beams, frames and grid. A non-mathematics intuitive and qualitative approach to architectural structures.

ARC 707: Landscape Theory And Design 2 Units

Elements of landscape design. Study of Architectural interiors and landscape. The use of natural element in landscape design. The course is designed to develop general appreciation of natural and man-made landscape and to sensitize the students in designed with nature.

ARC 708: Building Economics 3 Units

Income and Expenditure control in building processes. Choice and acquisition of sites and their effects and development, source of funds for development, public investment, mortgage financing development bonds, loans grants, subsidy and taxation. Introduction to cost control, meaning of cost control system, the need for cost control, aims of cost control. Design Economics – cost implication of design variables and construction methods. Preliminary estimates, methods of preparing approximate estimate. Establishment of cost targets.

ARC 709: History of Western Architecture 2 Units

A chronology of the development of the aesthetic theory in the western world. Principal theoreticians of the classic Byzantine, medieval and renaissance epoch. The development of new-classicism in Europe. Assigned readings.

ARC 710: Modern Movement In Architecture 2 Units

Review of the development of modern Architecture since 1900. Examination of the various theoretical propositions that have formed the new architecture in the West European countries and America. The works various master are studies in detail and compared so as to understand the modern trend in architecture. Post -modern architecture also to be examined. A critical appraisal of the theory and practice of contemporary architecture in developing countries.

ARC 711: Building Structures (Reinforced Concrete Design) 2 Units

Introduction to the theory and design of simple reinforced concrete structures: Development of elastic theory of RC beams, slabs and columns. Understanding the behavior of R.C. structures and the development of graphic skills in the presentation of design results.

ARC 712: Building Law 2 Units

Types of contracts. Formation of Contracts. Law relating to the interpretation of contracts. Legal rights and obligations of client, architect, surveyor, clerk of works, contractor. Building bye-laws and rights of adjoining owners. Arbitration and settlement of accounts.

ARC 713 : Interior Design 2 Units

A general introduction to interior design. Discussions of aims and principles of interior design from the contemporary point of view. Problems in the designing of residential interior Exercises in planning spaces, materials, furniture and color to fit assumed conditions. Presentation to solutions in plans, elevations, perspectives and models.

ARC 714: Building Structures (Steel/Timber Design) 3 Units

Application of principles of structural design and analysis of members used in contemporary timber and steel-frame buildings. Design of beam girder and trusses. Welded and reverted connections, columns, bearing plates etc. Theories of wind braces and effect on building design comparative analysis are used as a means of revealing the explicit intent in the design of the built form. Case studies will be drawn from tradition and contemporary sources to reveal the built form as embodiments and expressions of differing conditions of nature, use, technology and value. The aim of the course is to reveal through comparative analysis the capacity of the built form to meaning, to sensitize the student designer to the subtle significance in spatial organization and detailing as

cultural discourse.

M. TECH

Master of Technology in Architecture

Master of technology (M. Tech) Architecture, as an interdisciplinary field embraces science Technology and the Humanities in the solution of environmental design problems. Because designers perform critical roles in improving the quality of the built environment, the process of their education must recognize and be sensitive to human needs and aspiration as well as to the wise use and conservation of resources. The programme at the Federal University of Technology, Akure recognizes these and attempts to provide the student with a sound grasp of the technological choices suitable and critical to national development

AIM AND OBJECTIVES

The aim and objectives of the Postgraduate in Architecture are rooted in those offered at the undergraduate level but given more emphasis at this higher level. These aim and objectives are summarized as follow:

- To produce competent, skilled and creative professionals who are capable of meeting the challenges of creating comfortable human environments.
- To explore the rich cultural, traditional or local resources of the country including the traditional technology and adapting them to modern effective use.
- To provide an educational process that recognizes, and is sensitive to, human needs and wise use and conservation of resources.
- To provide a comprehensive education such that the graduate is able to plan, design, build, commission, maintain and coordinate the allied professional inputs in the development of the human environment and
- To provide an educational structure that is flexible and able to meet the needs of Architectural education.

ADMISSION REQUIREMENTS

Candidates must satisfy the general regulation governing postgraduate admissions in Federal University of Technology, Akure

A good B.Tech Architecture degree of the Federal University of Technology, Akure or a good first degree of a recognized University in Architecture with at least a Second Class Honor's Lower degree.

In addition to above, a candidate other than the graduate of FUTA must produce evidence of industrial Training totaling a period of six months.

DEGREE REQUIREMENTS

In addition to the course work, the award of M. Tech degree is subject to the successful completion of an Architecture Design Thesis or a dissertation. The duration of the

programme is three semesters. The graduate of this programme is for the stage II registration of the Architecture Registration Council of Nigeria (ARCON).

REQUIREMENT FOR GRADUATION

A minimum total of 200 credit units is required for the completion of the course programme in B. Tech. (Arch) and 54 credit units required for the completion of the M. Tech (Arch) making a total of 524 credit units in all.

COURSE STRUCTURE

M.Tech

First Semester

Course Code	Course Title	L	T	P	U
ARC 801	Advanced Architectural Design (Life Project)	1	0	15	6
ARC 803	Specification Writing	2	1	0	3
ARC 805	Research Methodology	2	0	0	2
ARC 807	Professional Practice & Procedure I	2	1	0	3
ARC 809	Advanced Urban Design	2	0	0	2
ARC 811	Environmental Impact Assessment	2	1	0	3
ARC 813	Construction Management I	1	1	0	2
TOTAL					21

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
ARC 804	Arbitration & Awards	2	1	0	3
ARC 806	Design Economics & Cost Planning	2	1	0	3
ARC 808	Professional Practice & Procedure II	2	1	0	3
ARC 810	Applied Climatology	2	1	0	3
ARC 899A	Advanced Design Studio: Thesis I	2	0	0	16
TOTAL					28

Third Semester

Course Code	Course Title	L	T	P	U
ARC 815	Design Seminar Advanced Design Studio : Thesis II	2	1	3	4
ARC 817	Current Issues in Practice Design Seminar	2	1	3	4
ARC899B	Advanced Design Studio : Thesis II Current Issues in Practice	0	0	0	12
TOTAL					20

COURSE DESCRIPTION

ARC 801 Advanced Architectural Design (Life Project) 6 Units

The semester will be specifically focused on Life projects. Students are expected to undertake life projects of the University or where possible within the immediate locality. The department liaises with the appropriate authorities and gives the students at least three (3) design options out of which a student will be expected to work on one. Project implementation will not be subject to studio. However, students can consult with their studio adviser(s) on the topic chosen. All design parameters including cost and the structure of the building are expected to be taken into consideration.

ARC 899A: Advanced Design Studio Thesis 8 Units

The semester will concentrate on the choice of thesis Topic, identification of scope, data collection, and case studies and so on. Students are expected to defend their chosen topics before a panel of jurors.

ARC 899B: Advanced Design Studio Thesis 8 Units

The semester is mainly for Thesis Design and written report on Thesis. It involves collation and analysis of data collected, with the first departmental jury to assess data collected and analyzed by the students. The second departmental jury will assess design analysis and critical evaluation of the project with the aim of assisting the student. The final departmental **jury to screen candidates for the external examination** will focus on all drawing produced for presentation. The jury will assess design developments including presentation and work drawings, details drawings, presentation(s) and /or model. Also written Thesis must be concluded and dispatched to the external examiners before his arrival to examine the students in the department.

ARC 803: Specification Writing 3 Units

Principles and methods involved in the compilation of a

specification for building works, objectives and purpose of a specification. The specification as a contract document, legal tender and working aspects. Relationship to Bills of Quantities and drawings. Schedules, sources information, references. Outright and performance specifications, prime cost and provisional sums. Specification section, clauses and language. Master specifications, preparation, format, building and printing. Explanation of documents and general conditions.

ARC 804: Arbitration and Award 3 Units

General conditions of liability in Torts. Capacities of parties. Trespass to goods, person and property, fraud, negligence, nuisance and strict liability offences. Dangerous chattels land and structures. The nature and function of arbitration in relation to building contract disputes. The parties to arbitration. The arbitrator, his duties and powers. Discussion on a few case-studies.

ARC 805: Research Methodology 2 Units

Formulation and tests of hypothesis. Identification of dependent and independent variables, parameters etc. Sampling techniques, constraints and bias. Design of questionnaire instrument in the conduct on interviews. Data collection, handling and analysis. Limits of research activities. Application of research techniques to workshop and field situations. Introduction to computer hardware. Simple examples of data processing, numerical methods and statistical analysis. Practical exercise for illustration of basic concepts and uses of computers are essential.

ARC 806: Design Economics and Cost Planning 3 Units

Principles of building economics. Determinants of building costs and their precision. Discussions on uncertainty and investment economics. System and techniques of creative cost-control for buildings during schematic design, design development, construction document preparation and construction.

ARC 807: Professional Practice and Procedure 1 3 Units

An overview of the practice of architecture. Topics include professional organization and conduct, the architects services business law or company law, office organization and management, contract documents, building codes, aspect of contract management and cost control, accounting and site supervision. Guest speakers are invited.

ARC 808: Professional Practice And Procedure 2 Units

The building process. The process of Architecture and the Nigerian Institute of Architects. ARCON and the Degree No.1 of 1969. NIA conditions of engagement and codes of professional conduct. Brief development of NIA work stages, Building Control Messages.

ARC 809: Advanced Urban Design 2 Units

Concepts guiding the design of cities. Stockade city, market city and industrial city. Factors influencing the development and growth of new towns. Basic concepts guiding the design of component of cities, residential neighborhood, civic, spaces, recreational spaces, central business district, shopping centers, industrial areas and so on. The vocabulary or urban design elements urban space, scale in urban design, image of a city. Urban heritage analysis of world famous cities in urban spaces. The form, structure and dynamics of cities in developing cities in general and Nigeria is particular.

ARC 810: Applied Climatology 3 Units

This course introduces postgraduate students of architecture to the application of building climatology in architectural design. The maintenance of thermal comfort by the human body in different climatic conditions is used to determine the design of sun shading devices and choice of building materials and elements. The design of building for effective natural ventilation is introduced. Other topics covered include climatic site analysis, practical use of the Mahoney tables, recommendations for architectural design in the climatic design zones of Nigeria, control of tropical microclimates through landscape design, design of solar buildings, sustainable architecture, green architecture and green building rating systems. Each topic is covered within a two-hour lecture, but two smaller topics may be combined to form one lesson. Emphasis is placed on the achievement of environmental control through the building fabric and design, especially by using design aids such as Mahoney tables and climatic site analysis. The goal is sustainable (green) architecture, viz. the design, construction, occupation and maintenance of buildings premised on processes and technologies that are environmentally responsible and resource efficient throughout the buildings life cycle.

ARC 811: Environmental Impact Assessment 3 Units

Lectures and seminars are designed to familiarize students with systems of impact evaluation and develop their ability in value judgment. Examination of the policies and procedures for environmental impact and each student is expected to prepare an environment impact statement relative to a proposed development. Environmental positivism and Determinism, Definition, significance and scope of ecology. Examination of the analysis for environmental impact assessment studies. Environmental qualities standards, pollution control. Environmental protection feasibility studies. Environmental conservation as an aspect of environmental protection.

ARC 813: Construction Management 3 Units

Production Planning and Control-Bar Chart, Critical Path Method (CPM), Performance Evaluation and Review Techniques (PERT), Line of Balance etc. Coordination, control and supervision of project. Sites-site layout, site

management practices, reporting to management etc. Building Management procedure from inception to completion. Work study and productivity studies-method study, time study and activity sampling, incentives etc. Working capital and flow and fund – Budgetary control, cash flow, financial ratios and statement for the construction industry, personnel administration in the construction industry.

ARC 815: Design Seminar 4 Units

One of the requirements for this semester is the presentation of a design paper by the student. The subject of the paper must however be from an area of the students approved Thesis topic. The paper is expected to examine issues of considerable importance to design Thesis. The seminar paper is aimed at introducing the student to the act of academic paper writing and presentation.

ARC 817: Current Issues in Practice 4 Units

Further studies on professional practice and procedures to acquaint students with current issues and modern techniques in the practice of Architecture.

Masters of Landscape Architecture (M.L.Arch)

The 12-month Masters programme in landscape Architecture is directed towards the analysis, planning and design of exterior urban and rural state within the context of the context and climate of Nigeria in West Africa sub region. The programme is designed to accommodate both group and independent investigation of specific aspects of landscape architecture and to provide adequate background in professional management of aspects of landscape architecture. Each student will select and develop a thesis on contemporary rural and urban environment problems from the micro to regional scale and under the close supervision of an advisor or group of advisors.

ADMISSION REQUIREMENTS

Candidates for the Master's degree in Landscape Architecture should hold B.Arch degree of Federal University of Technology, Akure or the M.sc Arch professional degree or equivalent from recognized Universities.

Candidates having professional degrees in Urban and Regional Planning, or related disciplines may also apply with details of qualification an evidence of ability to communicate freely in graphics preferably, the presentation of a portfolio of the candidate creative two and three-dimensional work in different media.

COURSE OUTLINE

M.L ARCH.

Course Code	Course Title	L	T	P	U
LARC 821	Landscape Design and Construction	1	0	1 5	6
LARC 823	Plants and Planting Methods	2	1	0	3
LARC 825	Landscape Conservation and Rehabilitation	2	1	0	3
LARC 827	Terrain Analysis	1	1	3	3
	TOTAL				15

SECOND SEMESTER

Course Code	Course title	L	T	P	U
LARC 899	Landscape Design Thesis	0	0	1 8	6
LARC 824	Public Recreation Planning	2	0	0	2
LARC 826	Landscape Specification and Estimate	1	1	3	3
LARC 828	Environmental Input Studies	2	0	0	2
LARC 830	Professional Practice	2	0	0	2
	TOTAL				15

COURSE DESCRIPTION

LARC 821 :Landscape Design and Construction 1-0-15 6 Units

A series of design and construction assignment to be executed in the studio. Design and construction as an integrated process. Materials properties and construction techniques. Simple to complex landscape exercise, applying the materials and techniques of construction techniques and basic specification courses with an emphasis on user requirements.

LARC 822: Landscape Design Thesis 0-0-18 6 Units

A specialized individual study under staff supervision which enables the student to gain knowledge in some aspects of landscapes architecture not yet covered or to extend its knowledge in one ready cover. The study does not

necessarily require original experimental research for the purpose of discovering new facts or the testing of an hypothesis. It is neither an essay promoting the students unsupported opinion.

LARC 823: Plant and Planning Method 2-1-0 3 Units

The exotic and native plants in general use within the climatic zones in southern Nigeria. Availability uses and limitations methods of propagation, planting, fertilizing and after care. Commercial forestry, native and exotic grasses and shrubs, turf culture. Plant pest and diseases and their control by chemical and other means. A number of visits will be arranged to commercial plant and nurseries.

LARC 824: Public Recreation Planning 2-0-0 2 Units

Open space capable of use for public recreation is studied as a diminishing natural resource but increasing demand. Open space classification-natural parks, historic sites, reserves etc. are examined and achievement previewed. Overseas example of planted recreational use is studied in details.

LARC 825 Landscape Conversation and Rehabilitation 2-1-33 Units

Conservation is studied as the rotational use of the environment to achieve the highest sustainable quality of living. Principles of conservation and rehabilitation are examined and a number of specific examples studied. Landscape threatened or adversely affected by increasing misuse through mineral extraction, industrial waste disposal and blight are examined and studied. The studies may include methods of control and rehabilitation.

Larc 826: Landscape Specification And Estimates1-1-3 3 units

Principle and methods of landscape specification and an estimate. Outright and performance specification together with section, causes are terms appropriate to each type. Units rates for landscape operation-excavation, haulage, filling, top-soiling, grassing, paving etc. Cost of labour materials and overheads.

LARC 827: Taerring Anlysis 1-1-3 3 Units

An introduction to remote-sensing technique for landscape analysis including land form, vegetable, and land-use interpretation.

LARC 828: Environmental Impact Analysis 2-0-0 2 Units

Lectures are seminars designed to familiarize students the system of impact evaluation and develop the ability in value judgment. The series in include exercises in the use of matrix and examines both the policy and procedures for environmental impact study. A number of real cases are studied on each students is required to prepare an environmental impact statement relative to processed

development. The relationship between landscape architect, plant and the contractors and the legal responsibility of each code of ethnics, and scale of charges. Offices procedures, documentation and job organization.

LARC 830: Professional Practice & Procedure (ARC807 & ARC808 Renewed For Landscape Piaches)

M. PHIL (MASTER OF PHILOSOPHY)

The Master of Philosophy (M.Phil.) Architecture degree is a post-professional degree of a 24month duration, which offers research as the central component of the curriculum. The M.Phil. programme consist of a series of seminar-based and research oriented courses for both theoretical and practical issues. There is also the opportunity for specialized research in any of the areas of major concentration especially studies in the emerging trends in the practice of architecture. This will take the form of a comprehensive developed researched thesis done under the close supervision of an advisor or group of advisors. The product of this programme will be ready and suitable for employment in the academic and the architecture concerns in the public and private sectors.

PROGRAMME OBJECTIVES

The main goal of the programme is to train academics and researches in Architecture to acquire relevant skills. The objectives are specifically to;

- Expose candidates to the current research methodologies in the chase area of specialization:
- Enable candidates to identify problems in Architecture and proffer solutions to them; and
- Develop in candidates the mastery of appropriate conceptual and procedural skills to articulate a critical analysis of advanced study in Architecture.

JUSTIFICATION FOR THE PROGRAMME

The M. Phil. Programme is designed to meet the research needs of the students with the professional Master of Technology (M. Tech) degree in Architecture or its equivalent. It is intended to faster the development of independent research skills to enhance their ability to proceed to the Doctor of Philosophy (Ph.D.)

ADMISSION REQUIREMENTS

- (I) Candidates should hold the professional M. Tech (Arch) or B. Arch degree of the Federal University of Technology, Akure or other recognized Universities with a minimum Cumulative Grade Point Average (CGPA) of 3.0 on a 5-point credit scale and a minimum thesis score of 50%.
- (ii) Candidates with M.Sc. (Arch) professional degree or equivalent of other recognized Universities with 55.59% overall score.
- (iii) M. Phil candidates must have scored a minimum of

50% or 2.4 at the Professional Masters Degree programme.

- (iv) M. Phil/Ph.D: candidate shall have scored 60% and above or CGPA of 3.5 and above at the Professional Masters Degree Programme.
- (v) All application for admission shall be subject to Postgraduate Schools regulations and carrying capacities.

DURATION OF PROGRAMME

a. M.Phil Programme

The Master of Philosophy Programme shall be a Full-Time programme of twelve (12) to eighteen (18) months duration.

b. M.Phil/Ph.D Programme

The duration for M. Phil/Ph.D. programme shall be minimum of twelve (12) to maximum of eighteen (18) months and candidates who fail to meet the minimum requirement for conversion to Ph. D shall terminate the programme at the M. Phil level. The final oral examination shall follow the same procedure as for the M. Phil oral examination.

Furthermore, the M.Phil and M.Phil/Ph.D programme shall be on Full-Time basis.

REQUIREMENTS FOR GRADUATION

To be eligible for the award of the Master of Philosophy degree in Architecture (M.Phil. Arch) candidate must:

a. M.Phil Programme

For an M.Phil candidate and those who could not successfully convert to the Ph.D programme, the graduation requirement shall be as follows:

- i. The candidate must have passed a total number of 21 Course Units including 6 Units of Independent Research Thesis and 3 units of Research Methods and attain at least a pass mark of 50% in every course offered.
- ii. Present successfully one seminar paper in each of the following three courses: ARC 831, ARC 832, ARC 833 and pass all other prescribed exercises in the courses.
- iii. To proceed to Ph.D, the candidate must score an average of 60% or a minimum of 3.50 and above on a 5 point grading system.
- iv. If the candidate cannot proceed to Ph.D, the candidate will be awarded the terminal degree of M.Phil by successfully:
 - (a) passing all the courses recommended by the Department with a minimum score of 50% in each course including make-up courses.
 - (b) presenting at least 2 Seminars (Proposal and Progress Seminars), on a topic approved by the School of Postgraduate Advisory Committee in a specialized area (ARC 899).

(c) completing the thesis title registration according to the School of Postgraduate Studies regulations.

- (d) defending the research thesis of about 20,000 words in length, excluding appendices and bibliography, which shall be assessed at an oral examination organized by the School of Postgraduate studies. Academic members of staff shall supervise the thesis project, which will normally span two semesters.
- (e) fulfilling other conditions as prescribed by the School of Postgraduate Studies.

b. M.Phil/Ph.D Programme

i. Candidate is expected to pass a total number of eleven (11) Course Units, which shall include 3 units of Research Methods and attain at least a pass mark of 50% in every course offered. The candidate shall also sit for one comprehensive examination, which shall be a written examination to test the knowledge of the candidate in the course work and oral examination on the research proposal before a panel of examiners. The course work examination shall be graded as 60% and the research proposal (project) to be presented shall be graded as 40%. To proceed, the candidate must score an average of 60% or 3.50 on a 5 point grading system and above.

ii. Present successfully one seminar paper in each of the following three courses: ARC 831, ARC 832, ARC 833 and pass all other prescribed exercises in the courses.

iii. If the candidate cannot proceed to Ph.D, the candidate will be awarded the terminal degree of M.Phil by successfully:

- (a) passing all the courses recommended by the Department as approved by Senate with a minimum score of 50% in each course including make-up courses.
- (b) presenting at least 2 Seminars (Proposal and Progress Seminars), on a topic approved by the School of Postgraduate Advisory Committee in a specialized area (ARC 899)
- (c) completing the thesis title registration according to the School of Postgraduate Studies regulations.
- (d) defending the research thesis of about 20,000 words in length, excluding appendices and bibliography, which shall be assessed at an oral examination organized by the School of Postgraduate studies. Academic members of staff shall supervise the thesis project, which will normally span two semesters.
- (e) fulfilling other conditions as prescribed by the

School of Postgraduate Studies.

Note: For Non-FUTA graduates, appropriate translation of Transcripts will be carried out by the Department and Postgraduate School.

REQUIREMENTS FOR CONVERSION FROM M. Phil, M. Phil/PhD TO Ph.D. PROGRAMME

Requirements for conversion from M. Phil, M.Phil/Ph.D to Ph.D: A candidate who enters an M. Phil, M.Phil/Ph.D programme may convert to Ph.D programme if he/she fulfils the following requirements:

- i. Candidate must have successfully presented at least two seminars: proposal and progress seminars.
- ii. Prepares and submits to the Postgraduate School through the Department, a research plan considered suitable for pursuing a Ph.D. Degree;
- iii. Candidate must have presented a detailed report of research-work done up to the time of seeking conversion and submitted to the School of Postgraduate Studies any relevant published and unpublished materials that can be assessed by the Department.
- iv. Candidate must have completed all course work with CGPA of not less than 3.5 or 60% aggregate score in the M. Phil, M.Phil/Ph.D programme.
- v. Passes an oral transfer examination to be conducted by the panel drawn from his/her department on the subject of the research and related topics to the field of study.
- vi. Candidate must have fulfilled all other conditions as approved by the University Senate.
- vii. Candidate must obtain and complete Ph.D Conversion Form as appropriate.

Note: for candidates from other Institutions, Departments and Postgraduate School shall interpret transcript carefully before admission

COURSE STRUCTURE

M.PHIL .

First Semester

Course Code	Course Title	L	T	P	U
ARC 831	Nature and Philosophy of Architecture	1	0	3	2
ARC 833	Research Methods and Statistics	1	0	6	3
Electives					
ARC 835	Advanced Urban Design Workshop	1	0	3	2
ARC 837	Architectural Criticism Seminar	1	0	3	2

ARC 839	Computer Aided Design Seminar I	1	0	3	2
ARC 841	Environmental Studies Seminar I	1	0	3	2
ARC 843	Housing Theory and Seminar I	1	0	3	2
ARC 845	Landscape Theory and Design Seminar I	1	0	3	2
M.Phil: 2 Compulsory + 2 Elective Courses					9
M.Phil/Ph.D: 2 Compulsory + 1 Elective Course(s)					7

M.PHIL Second Semester

Course Code	Course Title	L	T	P	U
ARC 832	Design and Environmental Process	1	0	3	2
Electives					
ARC 836	Advanced Urban Design Workshop II	1	0	3	2
ARC 838	Architectural Criticism Seminar II	1	0	3	2
ARC 840	Computer Aided Design Seminar II	1	0	3	2
ARC 842	Environmental Studies Seminar II	1	0	3	2
ARC 844	Housing Theory and Seminar II	1	0	3	2
ARC 846	Landscape Theory and Seminar II	1	0	3	2
ARC 899	Independent Research Thesis	0	0	18	6
M.Phil: 1 Compulsory + 2 Elective Courses					12
M.Phil/Ph.D: 1 Compulsory + 1 Elective Course(s)					10

COURSE SYNPOSSES

ARC 831: Nature And Philosophy of Architecture 2units

Analysis of architecture/building science research with the framework of policies, directions, methods, priorities, resources, peculiarities and inter-dependence. The study deals with selected projects, case studies and research undertaking in the field of architecture, building sciences and interrelated areas. The course also seek to cultivate creative insights and creative insight in judgment in the studies by examining in seminars the following: signs and symbols, special concepts, expression and communication, ethics and aesthetics, morality and education etc.

ARC 832 :Design and Environmental Processes 2 Units

Analysis activities, ideas and resources for the future of architectural practice and building construction. Effects of urbanization, globalization and modernization on architecture, building construction and the build environment in Nigeria. Current issues on new products, methods and theories. Presentation by eminent scholars in architectural practice and other relevant professionals in the build environment. Assigned readings and seminars on topical issues in design and environmental processes.

ARC 833: Research Methods And Statistics 3 Units

Different approaches and tools for investigation. Application of least square regression theories to the analysis of variance and regression analysis, measurement and surveys, reliability and accuracy tests, special parametric, univariate and multivariate distributions, no parametric and sequential method of qualitative data, quantitative and qualitative methods of analysis. Further theory of statistical inference.

ARC 835: Advanced Design Urban Workshop1 2 Units

Urban design and the planning process. Nature and elements of urban design and as means of promoting beauty in the urban environment. Approaches to the analysis of cities, historical, theoretical, philosophical and practical. The recent concern of Urban Design-theories, pioneers and their ideas. Review of contemporary urban design inn ovations-garden city and green belt: super block; Centre's and industrial parks. Reading assignments and seminars are to be presented by candidates.

ARC 836: Advanced Design Urban Workshop 2 Units

Approach to City –Planning in Nigeria, Problems of urban design in Nigeria. Urbanization in developing countries in scale and pace. A review of major changes in Urban population in the last 100years. The impact of urbanization on housing and the urban environment. The link between urbanization processes, globalization, human shelter and environment. The quality of the general urban environment and human consequences of urbanization in developing countries. Reading assignments and seminars are to be presented by candidates.

ARC 837: Architectural Criticism Seminar units

2

Architectural criticism reveals the methods and techniques of the analysis and presentations of world known critics. It reveals the varieties of ways and means critics use in responding to architectural environment. It is directed to attempt to influence current decisions to affect more tolerable future by presentation of the seminar on the understanding of criticism, methods of criticism and the rhetoric of criticism.

ARC 838: Architectural Criticism Seminar 2units

The relationship between history, theory and criticism in architecture. Sources of architectural theory. The social ecology of architecture and its effects on architectural practices, theory, construction and criticism. The nature of criticism in architecture, it rolls and concerns. Types and context of criticism. Analysis of selected case-studies and seminar presentation.

ARC 839: Computer Aided Design Seminar 2units

Lectures and assignments in one or more of the following areas; introduction to design computing, architectural construction and computation, digital design fabrication, computational design, background shape grammars, special problems in shape grammars, geometric and programmed construct. Assessment is based on attendance, assignments, workshop and presentation of a research seminar in computation. The research seminar is presented publicly.

ARC 840: Computer Aided Design Seminar 2units.

Study of advanced projects in digital media, inquiry into computation and design, research seminar in computation and workshop in architectural computation. Current and required areas may be added as necessary. Assessment is based on attendance, assignments, workshop and presentation of a research seminar in computation.

ARC 841: Environmental Study Seminar 1 2units

Lectures and assignments in one or more of the following; green architecture, sustainable architectural, climate change and architectural design, environmental impact design, environmental impact assessment, passive solar architectural design, daylight and lighting design, micro climate analysis. Assessment is based on attendance, assignment and presentation of a two-stage seminar including case-study presentation in a selected area. In the first stage, the seminar is presented internally to the class members. In the second stage, the seminar reflects comments and corrections from the first stage and is presented publication.

ARC 842: Environmental Study Seminar 2Units

Lectures and assignments in the following areas; noise and auditorium acoustics, physiology and psychology of comfort theory, ventilation and air conditioning, service strategies, building performance analysis, energy and her flow calculation for architectural design, computer application in environmental studies, specialist topics and case study presentations. Current and required areas may be added as necessary. Assessment is based on attendance, assignments and presentation of a research seminar in computation.

ARC 843:Housing Theory And Seminar 1 2units

Housing policy and development issues. Third world housing processes and housing policies. And examination of policies and practices, in Africa and South East Asia. Lessons from the World Bank and other international agencies. Formulation and assessing housing policies at local and national levels. Methods of housing supply, sources, subsidies, rental control and finance. Land tenure system and the impact on housing policies, programme and institutional framework. The building industry, technology, materials and labour. Establishing target groups and planning for them. Analysis of selected case studies and seminar presentations.

ARC 844: Housing Thoery And Seminar 1 2 Units

The history of public policy in Nigeria. Sustainable housing policies and settlement problems in poverty areas. Design of component and systems for self-help; design and planning for self-sufficiency, low cost energy and servicing systems. Low cost energy and servicing systems. Government policies and the housing of squatters. Case study examination of squatters including the legal and administrative mechanism for development will be presented in a seminar session.

ARC 845: Landscape Theory and Design Seminar 1 2units

The course explores the knowledge of landscape architecture, juxtaposing both the built box and writings of landscape architects with texts that address methodology or theoretical and cultural contexts. It also examines the challenges to the profession from the point of view of ecology and arts. Principles and method of landscape specifications and estimates together with sections, clauses and terms appropriate to each type. Study of the availability, uses and

limitations, propagations and planning, fertilizing and maintenance of exotic and native plants in southern Nigerian assessment is based on attendance and seminar presentation.

ARC 846: Landscape Theory And Design Seminar 2 Units

Open space capable of use for public recreation is studied as a diminishing landscape resource but in increasing demand. Open space classification and world examples are examined and implication reviewed. Sustainable landscape architecture. Examination of the principle conservation, method of control, rehabilitation and the study of specific examples as the rational use of the environment to achieve sustainable quality of living. The role of landscaping in urbanization process. Assessment is based on attendance and seminar presentation.

ARC 899: Independent Research Thesis6 Units

This is an in-debt and original research work on area of architecture that is of interest to the student. The thesis on a researchable problem chosen by the candidate and approved by the candidate must be carried out under the guidance of a supervisor or group of supervisors. The student defends the thesis at the end of the course before a panel of examiner(s) in line with the school of post graduate studies procedure. The research thesis must make substantial s to knowledge.

Ph. D ARC**ARC 999: Doctoral Project**

The research which commences upon admission into doctoral candidacy status is an original investigation designed, conducted, analyzed and reported under the direction of a major supervisor and one or more co-supervisors. The doctorate candidate must be responsible for the design, analyses and conduct of the study which represents his/her individual intellectual and creative contribution to the subject area in question and to the discipline of architecture. Each candidate is required to prepare a thesis, which represents the report of the study, in an effectively organized and well written form. The candidate is expected to present at least three seminar papers before the final oral presentation. The thesis is examined in a Viva voce.

ACADEMIC STAFF LIST

S/N	SURNAME, Other Names	Qualification	Designation /Rank	Area of Specialization
1	ADEDEJI, Yomi Michael	M.Sc. Arch , (Ekpoma) 1997, Ph.D. Arch (Akure), 2007	Ag. HOD/ Reader	Building Materials/Technology, Housing Settlement Studies, Housing and Settlement Studies.
2	ARAYELA, Olatunde	B.Sc. Arch (Ife) 1981, M.Sc. (Ife) 1983, M.Sc. URP (Ife) 1996, Ph.D. (Akure) 2000.	DVCA/ Professor	Building Materials Technology, Low –cost Housing
3	OGUNSOTE, Olu Ola	M.Sc. Arch (Cracow) 1984, Ph.D. Arch (Zaria) 1990, MBA (Zaria) 1994, M. Eng. Structures (FUTA) 2015.	Professor	Computer Applications in Architecture, Building Climatology, Institutional Buildings, Structural Analysis
4	FADAMIRO, Joseph Akinlabi	B.Sc. Arch (Ife) 1981, M.Sc. Arch (Ife) 1983, Ph.D. Arch (FUTA) 2001.	Professor	Landscape Architecture, Urban Design Studies
5	OLOTUAH, Abiodun Olukayode	B.Sc. Arch (ABU) 1983, M.Sc. Arch (ABU) 1985, Ph.D. Arch (FUTA) 2000.	Professor	Human settlement Studies (Housing and Sustainability)
6	TAIWO, Abraham Adeniyi	B.Sc. (Jos) 1987, M.Sc. (Jos) -1990, Ph.D. (Akure) – 2009.	Reader	Housing Studies, Building Structures.
7	FADAIRO, Gabriel	B.Arch. (Akure) 1997, M.Arch (Akure) 2001, Ph.D. Arch (Akure) 2008	Senior Lecturer	Erosion Control in Urban Development
8	ADEGBEHINGBE, Victor	B.Sc Arch (New York) 1982, M.Arch (New York) 1985, Ph.D (Akure) -2011	Senior Lecturer	Housing Studies. Sustainability Issues, Renewable Energy Issues
9	AYENI, Dorcas Aina	B.Sc. Arch (Zaria), 1994 M.Sc. Arch (Zaria), 1998, Ph.D Leicester UK 2012	Senior Lecturer	Landscape Architecture and sustainable Urban Studies and Tourism Development.
10	AYOOLA, Hezekiah Adedayo	B.Tech Arch (Ogbomoso), 2004, M.Arch (Ife)- 2008, M.Phil. (Ife) – 2012, Ph.D. (Ife) – 2015.	Lecturer I	Housing, Environment – Behaviour Studies
11	FOLORUNSO, Clement Oluwole	MEM (Ado-Ekiti) 2002, M.Tech (Akure) 2007, Ph.D. (UTM, Malaysia) 2014	Lecturer I	Building Pathology and Building Materials performance in Tropical Climate
12	ODEYALE, Timothy Oluseyi	B. Tech (Akure), 1998, M.Tech (Akure) 2001, Ph.D. (Lincoln, UK) 2014.	Lecturer I	Architectural Theory and Sustainable Urban Studies

9.3.2 DEPARTMENT OF ESTATE MANAGEMENT (ESM)

1. AVAILABLE PROGRAMME

- A. Postgraduate Diploma (Estate Management)
- B. Master of Technology (M. Tech.) Estate Management
- C. Doctor of Philosophy (Ph D.) Estate Management
- D. Master of Real Estate (MRE) Program

POSTGRADUATE DIPLOMA (ESTATE MANAGEMENT)

Philosophy and Objectives

The programme is designed as both a terminal and conversion programme directed specifically to:-

- (i) provide an opportunity for further study and training in estate management/land economy for those in practice.
- (ii) help those who may wish to make up their deficiencies in their first degree especially to be able to pursue second-degree programmes.
- (iii) bridge the gap between the Higher National Diploma and first degree in Estate Management in order to allow the former to pursue higher degree programmes.

Admission Requirements

Candidate for admission to the programme should possess any of the following qualifications:

- (i) B.Tech (3rd Class degree) or equivalent in Estate Management of the Federal University of Technology, Akure or any other recognized University.
- (ii) H.N.D (lower credit and above) in Estate Management from a recognized polytechnic or college of Technology.

In addition, an applicant may be required as a condition of admission to undergo a selection process.

Programme Duration

The Programme runs for duration of a minimum of three semesters on full time basis and a maximum of four semesters.

Requirement for Graduation

Candidate must complete 42 units, which consist of 36 units of course work, and 6 units project dissertation. The project dissertation will span over the two semesters and will be based on original independent work on an approved topic to be supervised by academic members of staff. A panel of examiners will assess this during an oral examination.

COURSE STRUCTURE

1st Semester

Course Code	Course Title	L	T	P	U
ESM 701	Principles and Practice of Valuation				3
ESM 703	Principles and Applied Property Management				3
ESM 705	Investment appraisal and property development				4
ESM 707	Construction Management.				3
ESM 709	Urban Economics and Structure				3
	TOTAL				16

Second Semester

Course Code	Course Title	L	T	P	U
ESM 702	Plant and Machinery Valuation				3
ESM 704	Rating and National Taxation				3
ESM 706	Legal Studies I				3
ESM 708	Basic Research Methods and Computer Application				3
ESM 710	Dissertation				3
	TOTAL				15

YEAR II

First Semester

Course Code	Course Title	L	T	P	U
ESM 720	Project Dissertation II				3
ESM 721	Housing Process and Applied Regional Planning				3

ESM 723	Land Use and Resource Development			3
ESM 725	Real Estate Finance			3
ESM 727	Legal Studies II			3
ESM 799	Final project			6
	TOTAL			15

COURSE DESCRIPTION

ESM 701: Principles and Practice of Property Valuation 1

Fundamental valuation methods, Application of the principles and methods to the valuation of various interests in Landed property. Valuation of Assets of a company, Going concern valuation. Valuation For Insurance, Mortgage Rating, Probate etc. Surrender and Renewal of leases. Rent Control Regulations and the effects on value of properties. Valuation for compulsory purchases – valuation of special types of properties (petrol filling stations, hostels etc) Farm/Rural valuation, mineral valuation.

ESM 702: Plant And Machinery Valuation

Definition of value and valuation, Economic basis of property value, functions of plant and machinery valuer. Manufacturing process- primary and secondary processing. Identification of plant and machinery- micro and macro identification. Inventory taking, Approaches to plant and machinery valuation.- cost , investment and comparison methods. Depreciation and obsolescence factors in plant and machinery valuation. Asset valuation.

Principles & Applied Property Management

Management organization and functions, management theory. Aims and policies of property management. Land and housing policies of the various government, Management surveyors role – Marketing space, selecting tenants, leasing advice, collection of rents, chasing arrears, insurance, etc Port folio advice. Maintenance, improvement and modernization of buildings, maintenance problems, surveys and administration, life cycle costing, etc.

ESM 704: Rating & National Taxation

Income tax, nature and incidence. Allowances and deductions. Assessment of owners and occupier of landed property. Taxation of capital, Estate Duty, Capital Transfer Tax. Organisation and Administration of Rating. Assessment of properties, the valuation list and its preparations (objectives, proposals and appeals).

ESM 705: Investment Appraisal and Property Development

The nature of investment projects, investments decision

process, feasibility & Viability Indicators. Traditional and modern methods of appraisal techniques. The construction & building industry, public & private controls over development, physical limitation and financial constraints. The Development Team & process, project supervision and management, Monitoring and Evaluation.

ESM 706: Legal Studies 1

Elements of Law of tort. General principles of tort, Tort affecting land, Negligence, nuisance trespass, strict liability etc.

Elements of law of contract: Formation of contract, parties to a contract, void, violable and unenforceable contracts. Formation of contracts, remedial for breach etc.

Administrative law:- the machinery of government, the separation of power, the legislative, the executive, organization of courts and their jurisdictions, Administrative tribunals; the personnel of law, Remedy for administrative misconduct such as interlocutory injunction.

ESM 707: Construction Management

ESM 708: Basic Research Methodology and Computer Application

The use of Elementary statistical analysis in problem solving. Theory and practice of urban research design and operationalization. Multiple and partial correlations. Analysis of time-series data; simple and multiple regression analysis and their application. The use of computer – spread sheets, word processing etc. computer application to property management, valuation, investment analysis etc

ESM 709: Urban Land Economics & Structure

The economics of urbanization, theories of urban structure & growth. Location of economic activities. The urban land market. Economic aspects of urban valuation. Economics development & Transportation.

ESM 710 & ESM 720: Dissertation

ESM 721: Housing Process And Applied Regional Planning

Applied Regional Planning:

Planning standards, methods of collection organization and selection of planning data. Preparation of surveys and analysis of sources of information. Planning models and their relevance. Planning problems of large metropolitan complexes. Principle of planning for development & redevelopments, urban renewal etc.

Housing Process :

Housing as a basic human necessity, a major land use component an integral component of urban and regional development. The universality of the housing problem Classification of dwelling by building materials,

location, tenure and design variables

Assessing housing needs in quantitative and qualitative terms at the local, state and national levels. Population structure, household size and composition, replacement needs. Housing in relation to rural community development, the concept of standards and housing demands. Housing design and construction process.

ESM 723: Land Use And Resource Development

Proprietary land use analysis, social and legal theories of property. Implementation and progress of land reforms in selected countries. National land policy, conservation of natural resources, environmental pollution and control. Environmental Impact Assessment.

ESM 725:Real Estate Finance

The Nature of Investments, Real estate as an investment. Source of development Capital, control and management of working capital, budgeting and finance forecasting. Sources and Mechanism of real estate finance etc.

ESM 727:Legal Studies II. Elements of land law:-

The principles of English land law, historical outline of the development of freehold and leasehold estate, and interests. Legal and equitable interest in land, pledges, pawns, Mortgages and their nature in common law, Equity and Nigerian Law. The Role of lands in indigenous Nigerian society & economy. The nature of landholdings. Statute law dealing with land registration, Acquisition and administration, compulsory acquisition and state grants. Arbitration and Awards. The nature of arbitration, its origin and application to valuation. Expert evidence and proof of evidence.

B Master of Technology (M. Tech.)/ Doctor of Philosophy (Ph D.) Estate Management

1. Objectives of The Programmes.

Postgraduate programme in Estate Management are specifically directed towards providing academics and professional practitioners opportunities for further studies and research with a view to acquiring a body of more advanced and sophisticated analytical tools which are essential for sound and effective decision – making in land valuation, land development, land management and land use control. The specific objectives of the programmes include:

- (a) Producing high level graduates capable of handling policy matters relating to the development of Nigeria property industry;
- (b) Identifying research into theoretical concepts with a view to relating them to the practical solution of problems in the property industry;
- (c) Equipping graduate with the necessary tools for the advancement of knowledge particularly in the field of estate management;
- (d) Promoting to a deeper level, their capability in the

professional management aptitude and;

Widening the eligibility areas of applicants that could take advantage of the programme, thus increasing the manpower supply in the field of estate management.

2. Admission Requirements.

Candidate must possess any of the following qualifications in addition to satisfying the general University regulations for admission.

- (i) B. Tech. in Estate Management with at least Second Class Honours (Lower) of the Federal University of Technology, Akure or its equivalent.
- (ii) Postgraduate Diploma in Estate Management with a minimum of B average (Upper Credit) of the Federal University of Technology, Akure.

3. Programme Duration.

The M. Tech. Programme will be full-time for a minimum of 18 months. The PhD programme is 36 months Full-Time or 48 months Part-Time after the Master's degree.

4. Requirements for the Award of Degree

Candidate must complete a minimum of 28 Units course work and 12 Units of research to be qualified for an award of the M. Tech. Degree. A candidate for an award must conduct research and present thesis based on original independent work on an approved topic and pass an oral examination based on the thesis. The Ph.D degree is awarded mainly on the recognition of the candidate's high scholastic ability in research, the product of the research being a definite contribution to knowledge in the area.

1. Research Interests in the Department.

The department encourages research work in the following areas:

- (a) Real Estate Investment Analysis
- (b) Property Valuation
- (c) Property Management
- (d) Property Industry/Property Market Structure
- (e) Real Estate Finance
- (f) Urban Economic Analysis/Environmental Management/Conservation Strategies
- (g) Rural Development and Forestry

COURSE STRUCTURE

M. TECH. First Semester

Course Code	Course Title	L	T	P	U
ESM 801	Advanced Valuation				2
ESM 803	Urban Economics and Structure				2
ESM 805	Seminar in Feasibility and Viability studies				2
ESM 807	Real Estate Equity Investment and Administration				2
ESM 809	Land Resources regulation and enterprise management				2
ESM 811	Research Methodology I				2
ESM 813	Housing Process and Policy				2
TOTAL					14

2nd Semester

Course Code	Course Title	L	T	P	U
ESM 802	Real Estate Finance				2
ESM 806	Urban and Regional Administration in Nigeria				2
ESM 808	Resource Use and Environmental Policies				2
ESM 810	Real Estate Investment Portfolio Management				2
ESM 812	Rural Environment and Policies				2
ESM 822	Research Methodology II				2
ESM 814	Research Project I & II				12
ELECTIVES					2
TOTAL					26

Plus one Elective from any of:

Course Code	Course Title	L	T	P	U
ESM 816	Seminar In Property / Facility Management				2
ESM 818	Plant and Machinery Valuation				2
ESM 804	Urban Land Economics and Public Policy				2

7. Course Description

ESM 801: Advanced Property Valuation and Appraisal

Fundamental Valuation Models. Valuation as a guide to business decisions. Appraising residential and income properties. The development of appropriate valuation techniques for use in Nigeria including a consideration of alternative to conventional valuation approaches. Valuation of Sacred Places. Disturbance, compulsory acquisition and compensation problems.

ESM 802: Real Estate Finance

Mechanisms of Real Estate Finance, Sources of Funds, Loan Contracts, Principles of Mortgage Equity analysis. Role of government Agencies. Latest developments in Nigerian Mortgage Industry. The Nigerian Financial Environment and Real Estate Finance. The Impact of Fiscal and Monetary Policies on availability of mortgage credit.

ESM 803: Urban Economics/Structure and Dynamics

Nature and Structure of Urban Economics Location of Economic activity; Economic Analysis in an Urban Framework; Principles of Urban Economic Development, Housing, Poverty and unemployment. The theory of land price and the structure of property markets in urban areas. The impact of fiscal policies. The Economics of Building Development. Urban Land Use Succession Theory.

ESM 804: Urban Land Economics and Public Policy

Urban Land Policy as expressed in the institutional devices and practices which mold economic decisions and actions relative to land use in metropolitan areas; zoning, comprehensive plans, official maps, building codes, subdivision regulations, taxation, and urban renewal legislation treated with an economic and planning emphasis. Urban economic structural growth, enterprise development and urban area socio-economic dynamic. Factor in urban area growth and economic change, Locational interdependence and consumer behaviour preferences.

ESM 805: Seminar in Feasibility and Viability Appraisal

Feasibility research technique and appraisal theories applied to actual case situation in the field. Students may be expected to work in teams on selected projects. Philosophic basis of research technique; case applications to problems of urban land economics.

ESM 806: Urban and Regional Administration in Nigeria

Urbanization and related phenomena. The nature, characteristics and development of urban areas. Theories of urban growth and developments,. Relationship between urban areas, politics, services, employment, pollution, revenue generation and community, development. Regional planning and administration. The relationship between regional and local agencies.

ESM 807: Investment Appraisal & Decision Analysis

The investment media, real estate as an investment: investment strategy and objectives. The real estate market and its characteristics; real estate as an investment; risk and return characteristics; techniques of appraisal; discounting and non discounting; Capital rationing, weighted cost of capital, inflation and real estate investment. Introduction to performance measurement and portfolio management.

ESM 808: Resources Use and Environmental Policies

Competitive land resources usage. Compatible and incompatible uses. Land capability and classification. Environmental regeneration conservation.Recycling of land. Environmental influenced on modes of production. Land policy and environment. Resource data bank.

ESM 809: Land Resources Regulations and Enterprise Management

Basis principles of the law affecting the use of land and natural resources including legal remedies and defenses available to the private sector. Land Use and Resource Conservation. National Economy and implications for real estate decision making. An overview of Nigeria's land resources and conservation strategies. Impact of Man's activities on Natural Resources.

ESM 810: Real Estate Investment Portfolio Management

Scope, rational and techniques of portfolio management. Fundamental and Technical Analysis, Portfolio Analysis-Expected Return, Risk reduction and diversification benefits.; Risk-Return calculations of Portfolios; Portfolio Selection and Revision;. Perfomance measurement and analysis. Construction of performance index.

ESM 811:Research Methods and Techniques I

Theory and practice of urban research design and operationalization. Types of research, Research design, Research topic selection, Instrument of Data Collection

techniques, Data Analysis techniques, data Presentation methods, Application of Computer packages to research, Research reporting styles, and Citation of references; Elementary statistical analysis.-Measure of Central Tendency and Spread; T-Test and Analysis of Variance. Non parametric statistics.

ESM 812: Rural Environment and Policies

Conflicts between users of the rural land. Agricultural and Rural Development in Nigerian. Economics of small farms. Development of the village. Problems of remote areas; possible solutions. The institutional background to rural amenity and recreation. National and regional parks. Forestry and economic development. Recreation problems and policies in Nigerian. Principles of economy, eco-systems and modern world. Rural industrialization in integrated rural development. Land policy and rural development.

ESM 813: Housing Processes and Policies

Economic principles and problems of housing demand; supply and market analysis Functioning in an institutional setting of private practices and governmental policies of control and assistance. The business of creating housing including strategy, market and merchandising trends, legal and political constraints site collection procedures and financial analysis and control, single case studies emphasizing rental property management and federally subsidized projects for lower income families. The formulation of housing policies and programmes in Nigeria. Comparative Survey and analysis of housing policies in different countries of the world. Housing as a sector of investment and integral part of national development plans in Nigeria. Approaches to the identification of housing needs the determinants of standard and criteria in the design of houses.

ESM 822: Research Methods and Techniques II

Correlations Analysis; Regression Analysis- Simple, Multiple, Non Linear, Qualitative Response, Panel Data Model; Analysis of Time-Series data.

D. MASTER OF REAL ESTATE (MRE) PROGRAMME

1. ROGRAMME OFFERED: Master of Real Estate (MRE) -Professional
2. DEGREE OPTIONS
 - a) Master of Real Estate (MRE) (Land Management)
 - b) Master of Real Estate (MRE) (Plant and Machinery Valuation)
 - c) Master of Real Estate (MRE) (Facilities Management)

3. PROGRAMME PHILOSOPHY

The Master of Real Estate (MRE) degree programme has

been designed to meet the contemporary and future demands of real estate industry. Since the nature and scope of the industry have changed and are changing dramatically over the years, there is the need for the advancement in the knowledge, techniques and tools required for decision making in the industry. One of such areas is the need to advance knowledge in the principal areas of specialization in the industry; this is what this programme is set to achieve. The programme is designed for professionals and executives in the industry who desire to acquire advanced knowledge.

4. PROGRAMME OBJECTIVES

The MRE programme aims at providing opportunities to gain advanced knowledge and acquire techniques that are essential for efficient and effective real estate decision making with a view to improving professional and managerial performance of the practitioners. The specific objectives of the programme are to:

- provide high-level manpower capable of handling policy matters relating to Land Management, Plant and Machinery Valuation and Facilities Management;.
- acquaint real estate professionals with the recent advances and analytical tools in the industry and equip them with the ability to apply these to the solution of theoretical and practical land resources problems; and
- develop and enhance professional competence in order to produce practitioners that have entrepreneurial skills of value for self-employment in the real estate industry.

5. ADMISSION REQUIREMENTS

Candidate must possess any of the following qualifications in addition to satisfying the general University regulations for admission:

- B. Tech.in Estate Management with at least Second Class (Honours) Lower Division of the Federal University of Technology or the equivalent.
- Postgraduate Diploma in Estate Management with a minimum of Lower Credit of the Federal University of Technology, Akure or any recognized University.
- Candidates who possess a minimum of a Second Class (Honours) Lower Division First Degree in Mechanical Engineering or Production Engineering may be admitted into Facilities Management or Plant and Machinery Valuation option.
- Candidates who possess a minimum of a Second Class (Honours) Lower Division First Degree in Electrical Engineering; Building; Architecture; or Quantity surveying may be admitted into Facilities Management option
- Candidates who possess a minimum of a Second Class (Honours) Lower Division First Degree in : Law; Urban & Regional Planning; Land Surveying may be admitted into Land Management option.

PROGRAMME DURATION.

The MRE Programme runs for duration of a minimum of

eighteen months on a full time basis and a minimum of 24 months on a part time basis

REQUIREMENTS FOR THE AWARD OF DEGREE.

Candidate for the different MRE degree options must complete the minimum course units as specified below to qualify for an award of the MRE degree:

Land Management Option: 51 units

Plant and Machinery Option: 51 units

Facilities Management Option: 55 units

The minimum course unit must include 6 Units of Masters Project Report.

6. COURSE STRUCTURE

First Year

First Semester (All Options)

Course Code	Course Title	L	T	P	U
ESM 801	Advanced Valuation	2	1	-	3
ESM 807	Investment Appraisal & Decision Analysis	2	1	-	3
ESM 815	Real Estate Economics	2	1	-	3
ESM 817	Real Estate Law	2	1	-	3
ESM 819	Information Management and Computer Application	1	-	6	3
TOTAL					15

Second Semester

Land Management Option

Course Codes	Course Titles	L	T	P	U
ESM 820	Land Information Management	1	0	6	3
ESM 822	Land Policy and Reform	2	1	0	3
ESM824	Urban land Management	2	1	0	3
ESM 826	Conservation and Land Resource Management	2	1	0	3
ESM 828	Environmental Valuation	2	1	0	3
TOTAL					15

Plant and Machinery Option

Course Code	Course Title	L	T	P	U
ESM 830	Plant and Machinery Valuation I	2	1	-	3
ESM 832	Industrial Economics and Process	2	1	-	3
ESM 834	Principles of Insurance	2	1	-	3
ESM 836	Financial Management Principles	2	1	-	3
ESM 840	Asset Maintenance Management	2	1	-	3
TOTAL		15			

Second Year

First Semester Land Management Option

Course Codes	Course Titles	L	T	P	U
ESM 821	Land Administration	2	1	-	3
ESM 823	Seminar in Land Use and Control	-	-	9	3
ESM 825	Gender, Informal sector and Land Accessibility	2	1	-	3
ESM 827	Compulsory Acquisition and Compensation	2	1	-	3
ESM 829	Land Law	2	1	-	3
ESM 877	Master's Project Report	-	-	18	6
TOTAL		21			

Facilities Management Option

Course Code	Course Title	L	T	P	U
ESM 840	Asset Maintenance Management	2	1	0	3
ESM 842	Principles and Practice of Facilities Management	2	1	0	3
ESM 844	Space Planning and Management	2	0	0	2
ESM 846	People & Organizational Management in the Built Environment	2	1	0	3
ESM 848	Facilities Project Management (Theory and Practice)	2	0	3	3
ESM 850	Piped and Fire Services	2	0	0	2
TOTAL		16			

Plant and Machinery Option

Course Codes	Course Titles	L	T	P	U
ESM 831	Plant and Machinery Valuations II	2	1	0	3
ESM 833	Plant and Machinery Valuation Report Writing	1	0	6	3
ESM 835	Principles of Machine Tools and Factory Equipment	2	1	0	3
ESM 837	Field Trips and Industrial Visits	0	0	9	3
ESM 845	Business Management for Built Environment Professionals	2	1	0	3
ESM 877	Master's Project Report	0	0	18	6
TOTAL		21			

Facilities Management Option

Course Code	Course Title	L	T	P	U
ESM 837	Field Trips and Industrial Visits	0	0	9	3
ESM 841	Financial Planning and Control of Facilities	2	1	0	3
ESM 843	Indoor Quality and Built Environmental Performances	2	1	0	3
ESM 845	Business Management for Built Environment Professionals	2	1	0	3
ESM 847	Electrical Systems, IT and Intelligent Buildings	2	1	0	3
ESM 849	Sustainable Practices in Facilities Management	2	1	0	3
ESM 877	Master's Project Report	0	0	18	6
TOTAL					24

applications to the construction market. Functions of the Real Property market, The pricing of land and land resources, Investment in real property, Public sector development: Cost-Benefit Analysis, Housing, Economic Theory and public finance, The incidence of taxation on land resources, The impact of government Macro policy on land and property resources.

ESM 817: Real Estate Law 3 Units

General principles of tort affecting land, negligence; nuisance trespass, strict liability; liability for animals, employers liability to workmen, defenses and liability of occupier. Formation of a contract, parties to a contract; void and voidability of a contract, termination of contracts; remedies for breach. Special topics: sales of land and goods; agency, the legal position of auctioneers and estate agents, insurance etc. hire purchase. The meaning and inter-relationship of ownership, possession and title; Pledges and pawns. Mortgages and their nature; Basic principles of Land Use Act of 1978.

ESM 819: Information Management and Computer Application 3 Units

Information in decision making; information in management; the information technology; applications of information technology; Property information needs; property information sources; Introduction to business management software – spread sheets, word processing, Auto Card, Data base, Management system. Simple software which are of direct application to investment analysis in relation to Estate Management practice e.g. Computerized valuation, computerized asset and inventory valuation, computerized agency and property management systems. The Estate Surveyor and the internet.

ESM 820: Land Information Management 3 Units

Land Records And Information systems, land registration and transfer processes; cadastral or mapping of ownership; case study of computerization of land registration system; problems of inter-ministerial collaboration in LIM; Land Information Management as an aid to decision making; application of GIS to land management; spatial data infrastructural development; e-land transaction process; bureaucracy in land information management; organizational approach to land information management; man power development for land information management; factors mitigating against efficient land information management in Nigeria.

ESM 821: Land Administration 3 Units

Methods of disposal of Government land; Conditions of grant of C of O; land administration problems and practice; structure and functions of various Government departments and agencies associated with land administration in Nigeria; subsequent transactions in formal and informal land market, Land acquisition, allocation and revocation.

ESM 801: Advanced Valuation 3 Units

Fundamental Valuation Models; Valuation as a guide to business decisions; Appraising residential and income properties; The development of appropriate valuation techniques for use in Nigeria including a consideration of alternative to conventional valuation approaches. Valuation of Sacred Places; Disturbance, compulsory acquisition and compensation problems

ESM 807: Investment Appraisal and Decision Analysis 3 Units

The investment media, real estate as an investment: investment strategy and objectives. The real estate market and its characteristics; real estate as an investment; risk and return characteristics; techniques of appraisal; discounting and non discounting; Capital rationing, weighted cost of capital, inflation and real estate investment. Introduction to performance measurement and portfolio management.

ESM 815: Real Estate Economics 3 Units

Market theory: supply and demand analysis, factors influencing demand and supply, and market equilibrium. Supply and Demand factors influencing property values. Elasticity of supply and demand, shift of equilibrium and its

ESM 822: Land Policy And Reform	3 Units	ESM 827: Compulsory Acquisition and Compensation
Land policy formulation: Implementation of land policies; specialized institutions of land policies; classification of land tenure systems; principles of alienation and occupation of public land; meaning of land reform; land reform objectives and strategies; purpose and progress in national land reforms in selected countries.	3 Units	Principles of the laws of compulsory purchase and compensation, Evaluation of Public Land Acquisition: Public Lands Acquisition Act., 1917; the Land Use Decree and provisions for compensation; Variation in Compensation – Southern and Northern States. The Importance of Publication of Compulsory Acquisition Notice: Survey Description; Notice to treat; Mode of publication and service of notice; Making claim and counter claim; Acquisition by Oil Companies: Rights and privileges of a license; Joint Venture Companies; The Crucial Role of Land in the petroleum industry; Fair and Adequate Compensation; Acquisition process; Assessment of Compensation; Crop Enumeration; Compensation for annual crops; Alternative Methods of Assessment to Adequate compensation; Oil pollution claims. Compensation for Ecological Disturbance in the Petroleum Industry, compensation for injurious affection and disturbance; electricity, way leaves, service easements, pipelines and gas installations; Need for Reform.
ESM 823: Seminar In Land Use and Control 3 Units		
Student is expected to present an independent seminar on any area of land use and control.		
ESM 824: Urban Land Management 3 Units		
Urbanization and Land Use & Values Patterns, Value Determination – Accessibility and Complementarily, Urban Land Use and Transportation, Congestion, Traffic and Parking. Technology and the city spatial structure growth. The Urban Economic Base, Pollution and Environmental Quality in Nigeria, An Overview of Environment - Oriented Policy Measures in Nigeria Urban Policy. The need for policy. Argument for and Against urban policy formulation. Antecedent and Contemporary Urban Policy Measures in Nigeria, New Town Development: Public and private; Planning and the compensation /Betterment problem.		
ESM 825: Gender, Informal Sector and Land Accessibility 3 Units		
Concept of Land Accessibility: Measurement of accessibility of land; qualitative and quantitative parameters; Formation of land rights; procedure, benefits and effects on women's tenure. factors governing accessibility of land; gender issues in accessibility of land and property right: barriers to women's access to right and property right; Supply side and demand side factors; gender, land use, and urban livelihood; women in agricultural and home based enterprises; Nature and constituents of Nigerian informal sector: types of Informal sector employment and their land use; squatter business premises on public land; urban transportation and poverty alleviation; urbanization and the growth of informal sector; informal sector and access to land: sources of finance for the informal sector; informal land market and security of tenure; mechanisms for management of land related disputes.		
ESM 826: Conservation and Land Resource Management 3 Units		
Identification of Land resources for Conservation purpose; Cause of environmental degradation and the need for conservation in Nigeria; Urbanization and Conservation: Changes in patterns of Land Use; Ecotourism as a tool for conservation; management of tourist centres (natural and man-made); reclamation of land and management of coastal land; desert encroachment and soil erosion mitigation; the role of the market in land resources allocation; management of national monuments and historic buildings.		
ESM 828: Environmental Valuation 3 Units		
		An overview of the environment, environmental economics, Valuation of environmental resources, environmental values; categories of environmental values- use value; indirect use values; non-use values and intrinsic values; risks and uncertainty in environmental restoration programme; valuation and environmental contamination, theory and methods used in the valuation of properties with impairments or detrimental conditions, outlining valuation tools for analyzing real estate damages and the impaired condition
ESM 829: Land Law 3 Units		
		The principles of English land and law, Historical outline of the development of freehold and leasehold estates and interests, legal and equitable estates and interest in land; Pledges and pawns, Mortgages and their nature. The role of land in indigenous Nigerian society and economy, the nature of land holdings, creation of family ownership, customary forms of alienation, dealings with family property, Compulsory acquisition and state grants. Registration of titles of family land. Land Use Act of 1978.
ESM 830: Valuation Of Plant And Machinery I3 Units		
		The valuation process; basis of plant and machinery valuation – existing use value, alternative use value, going concern etc; macro and micro identification of plants and equipment. What constitutes plant and machinery and equipment for purposes valuation? Items exempted from plant and machinery valuation; Methods of valuing plant and machines, cost method, market ;approach, income approach. Depreciation and Obsolescence in plant and machinery valuation; factors that affects depreciation and obsolescence; methods of computing depreciation and obsolescence.

ESM 831: Plants And Machinery Valuation II 3 Units

Detailed examination of plant and machinery valuations for insurance, sale, balance sheet, takeover and merger purposes, privatization and commercialization etc. examination of the application of standards to asset valuation practice; tales of estate surveyors, engineer and accountant in plant and machinery valuation in Nigeria.

ESM 832: Industrial Economics and Process 3 Units

Nigeria industrial history and economics- a wider appreciation of the impacts of Nigeria economic policies (SAP, Privatization and Commercialization of government assets etc) on plant and machinery values; financing industrial properties; location of industries; materials and processes in manufacturing- general knowledge of raw materials, plants and production process of industries such as textiles, iron and steel, food, canning and drinks, timber processing, cement manufacturing.

ESM 833: Plants and Machinery Valuation Report Writing 3 Units

Each student would be made to carry out inspection and write valuation reports on at least five different types of real life industrial properties for mortgage, sales, purchase, insurance, proof of evidence, merger and acquisition.

ESM 834: Principles of Insurance 3 Units

Theory and practice of insurance and its economic and social significance; basic life, health, and property-liability insurance for organizations and families; review of the major lines of insurance; insurance and major risks associated with real estate; concepts of reinstatement and indemnity; depreciation and cost method of valuation for insurance purpose.

ESM 835: Principles of Machine Tools and Factory Equipment 3 Units

Introduction to material processing-nature of manufacturing; organizational structure of manufacturing, and industrial materials; casting and molding; forming; separating; conditioning; assembling; and finishing; process design and control; factory layout and design; power equipment, transportation equipment and conveyors; machine tools.

ESM 836: Financial Management Principles 3 Units

Accounting theory and methods; asset and liability valuations; budgeting and cash flow analysis; decision making based on cost data; industrial, commercial and residential property finance; interpretation and comparison of financial statements, management of working capital, budgetary planning and control, capital budgeting techniques, preparation of financial proposals for facilities management activities ; relevance of depreciation.

ESM 837: Field Trips and Industrial Visits 3 Units

Students are expected to make field trips and visit related industries both on individual and group bases in order to familiarize with the actual practice in the industry. They are expected to submit reports on their visits for assessment.

ESM 840: Asset Maintenance Management 3 Units

Basic definitions, concepts and principles of facilities maintenance: maintenance defined; maintenance generators; facilities maintenance work elements; maintenance cycles; planning factors; life of building; total building costs; life cycles of materials, components and services; service systems operation/maintenance cycles; factors influencing maintenance and replacement including economic considerations; maintenance profiles; Maintenance policy and standards; planned and responsive maintenance; asset appraisal and evaluation; information management; maintenance; property portfolios; acquisitions and disposals.

ESM 841: Financial Planning and Control of Facilities 3 Units

Resources management and control: facilities maintenance budget composition; long-term budget; medium- and short-term budgets; budgetary planning and control ,requirements development; reimbursable services; administration of service charge accounts; institutional operating plan/program operating plan; financial control; budget preparation; subdivision of budget; types of costs; cost indices; stock control; space; relocation issues; taxation; facilities performance and financial management.

ESM 842: Principles and Practice of Facilities Management 3 Units

Principles and practice of facilities management for general facilities offered in the industry. Development, implementation and management of facilities management strategy; Support services management; strategy for the provisions of support services; ordinances and regulations relating to the operational management of facilities and support services

ESM 843: Indoor Quality and Built Environmental Performances 3 Units

Air-conditioning, Heating system, Mechanical ventilation, Indoor air quality, HVAC control, Commissioning, operation and maintenance, Plant operation and preventive maintenance and servicing, Energy conservation, Energy management opportunities and priorities, Energy management systems, Energy codes. Thermal effect on building, Condensation in buildings, Natural ventilation, Thermal comfort, Photometry and lighting comfort, Interior lighting, Exterior lighting, Day lighting, Sound and people, Sound transmission, Room acoustics, Sound measurement and noise control, and Miscellaneous environmental performance indicators.

ESM 844: Space Planning and Management 2 Units

Space management and space use; Space strategy; Impact of structure and services on space use; Preparing briefs for office layouts; Managing changes in accommodation; furniture arrangement, selection and specification; effect and constraints of structure and services on layout; space and operation; requirements of customers; buildings Ordinance and Regulations and other relevant legislation related to the alteration and addition work and use of space.

ESM 845: Business Management For Built Environment Professionals 3 Units

Professional firms: sole proprietorship, groups, consortium, partnerships, their organization and management; Office Procedure and management – Organization of personnel, job description, chain of authority, departmentalization, specialization; office organization- office records; communication and coordination; office procedures- cash flow, management

ESM 846: People and Organization Management in the Built Environment 3 Units

Perspectives on management theory; organisational environment; organisational objectives, strategic planning; organisational structure; organisational culture; motivation and leadership; teamwork and team building; management of organisational change; interpersonal and organisational communication, Concept and philosophy human resource management; human resource planning; recruitment and selection, training and development; performance and appraisal; remuneration and compensation systems; job design; communications and consultation; industrial relations.

ESM 847: Electrical Systems and Intelligent Buildings 3 Units

Components of internal and external electricity supply systems of buildings, and their standard ratings; General regulations of installation and maintenance of electrical services of buildings: power supply system (main and emergency/back-up), Earthing and Lightning protection schemes; communication, monitoring, and access control systems.

ESM 848: Facilities Project Management (Theory and Practice) 3 Units

Common Facilities Management projects; project managers' roles and functions; life cycle costing; risk management; project targets and briefs; project planning; master programme; short-term programme; stage programme; critical path analysis; bar charts; PERT; precedence network; progress control; cost control; cash flow analysis; project evaluation and financing; project information and documentation.

ESM 849: Sustainable Practices in Facilities Management 3 Units

Contemporary issues in FM; assessment procedures, and

standards for sustainable and strategic facilities issues; sustainability, energy management: field installation energy management, employee involvement initiatives, metering, energy surveys and project planning, improved facilities operation and maintenance, energy conservation investments and energy savings performance contracts., waste management: avoidance, minimization, recovery/recycling/re-use, bulk reduction and disposal of general waste and specialist areas such as construction and demolition materials, hazardous chemicals, clinical waste and confidential waste,, the working environment, and comfort and productivity in the workplace.

ESM 850: Piped and Fire Services 2 Units

Fire hydrant and hose reel systems, Sprinkler systems, Automatic fire alarm and detection systems, Fixed gas systems, Smoke control system, Passive fire protection including means of escape and means of access for firefighting and rescue, Services water characteristics and treatment, Cold and flushing water supply systems, Hot water supply systems, Sewage disposal and treatment, Refuse disposal and chemical disposal systems, Swimming pools water supply systems, and Relevant local ordinances, regulations, codes of practice and standards.

ESM 877: Master's Project Report 6 Units

Each student is expected to present a report on a case study in any area of interest to be approved by the department.

ACADEMIC STAFF FOR THE PROGRAMME

S/N	NAME OF STAFF	QUALIFICATION	STATUS	SPECIALISATION
1	Bello, V.A	PhD ANIVS RSV	Reader, Head of Department	Property Valuation
2	A.S. Asaju	PhD ANIVS	Professor	Rental housing Market Analysis
3	M.O Bello	Ph D ANIVS;RSV	Professor	Real Estate Investment Analysis & Land Policy
4	Adebayo M. A.	Ph D. ANIVS, RSV	S/ Lecturer	Land use Management
5	Oladapo R.A	Ph D ANIVS, RSV	S/Lecturer .	Land economics
6	Ogunleye M.B.	Ph D; ANIVS;RSV	S/Lecturer	Agency and management
7	M. AAjaii	Ph D; ANIVS	S/Lecturer	Housing
8	Babajide Ojo	PhD, ANIVS, RSV	S/Lecturer	Real Estate Development
9	A.O. Adewusi	Ph D	Lecturer II	Property Valuation
10	S. P. Akinbogun	PhD, ANIVS	Lecturer II	Housing

ASSOCIATE LECTURER

11	Prof. C .A. Ajaii	Ph D, ANIVS	Professor	Property Valuation, & investment Analysis
12	Dr. B. T. Aluko.	Ph D ANIVS	Professor	Property Valuation
13	Dr. O. Ogunba	Ph D ANIVS	Professor	Urban Economics

9.3.3 DEPARTMENT OF INDUSTRIAL DESIGN (IDD)

PROGRAMMES OFFERED

- a) Postgraduate Diploma in Industrial Design (PGD IDD)
 - b) Masters of Technology in Industrial Design (M.Tech)
 - c) Doctor of Philosophy in Industrial Design (Ph.D)
- ii. practical skills in studio practices;
Imaginative leadership and knowledge to coordinate gained experiences; and
iii. Control in design and industrial processes in the areas of Ceramics, Graphics, Printing and Textile design.

AVAILABLE OPTIONS/SPECIALIZATION

- a) Ceramics
- b) Graphics
- c) Textiles

PHILOSOPHY AND OBJECTIVES OF THE PROGRAMMES

a) Postgraduate Diploma in Industrial Design (PGD IDD)

The Department trains students to advance the necessary creative and aesthetic skills that are needed in Industrial design. The field of Industrial Design is varied and each of its special areas can be developed as separate field of study. The programme deals with visual, aesthetic and technical proficiency in ceramics, graphics, textiles, interior and metal design. Industrial Design also considers the importance of such features as shape, configuration, ornament or pattern that could give visual appeal to manufactured products in two and three dimensional forms.

Objectives of the Programme:

The objectives of the programme are to:

(I) Serve as bridge programme for holders of Higher National Diploma (HND) certificates and equivalent qualifications that are desirous to proceed to the M.Tech (IDD) programme of the Department

- i) Develop students' ability to resolve visual communication problems relating to the Industrial design and Applied Arts subject matters.
- ii) Train students as designers for key design roles in Industrial Design practices and in related field.
- iii) Develop individual designers who have the ability to work in the industry or to set up their own studio.
- iv) To train individuals who can contribute to the continuing regeneration of tradition and industry through design innovation, technical understanding and individual excellence.

b) Master of Technology (M.Tech) Industrial Design

The Master of Technology Degree in Industrial Design is designed to equip candidates with more specialized technological knowledge in the following ways:

- i. Creative skills and technical know-how in studio

Objectives of the Programme:

The programme has been designed to:

- a. enhance in students the development of professional, industrial and technological skills in specialized areas as specified above.
- b. provide advanced studies in Industrial Design and related programmes through research and course work of lectures, seminars and practical studio experiments.
- c. meet the manpower requirements for the teaching of Art and Design programmes at post-secondary institutions in Nigeria.
- d. merge scientific investigation of research with aesthetic ideals and production processes so as to provide a broad spectrum of prototype design and production processes for relevant indigenous industries.
- e. provide opportunities in Nigerian Universities of Technology to meet higher management manpower needs in Industrial Design, production processes and developments.

c) Doctor of Philosophy (Ph.D) in Industrial Design

The degree of Ph.D in Industrial Design with the field of specialization in Ceramics, Graphics and Textiles are designed to prepare highly qualified individuals for distinctive achievement in the combination of scientific knowledge with indepth design thinking in solving design real life problems in the profession area of their choice professional areas/feilds.

The specific objectives of the programme are to:

- (i) Enhance the development of professional and independent research in specialized areas of Industrial Design.
- (ii) Promote the manpower staff development requirements for teaching and research in Industrial Design; in order to enhance the continued existence of the system.
- (iii) Merge scientific investigation with aesthetic ideals and be adequately vast in a broad spectrum of prototype design for related indigenous industries.

ADMISSION REQUIREMENTS

- a) Postgraduate Diploma in Industrial Design (PGD IDD)

Candidates for admission to the programme should possess any of the following qualifications:

- i. B.Tech in Industrial Design or its equivalent with at least Third Class Degree in Applied Art in any of the available option with a minimum of Second Class (Honours) of the Federal University of Technology, Akure, Nigeria or any equivalent degree in Industrial Design or Applied Arts from a reputable University in Nigeria or Overseas.
- ii. Postgraduate Diploma in Industrial Design of the Federal University of Technology, Akure with a minimum of Upper Credit in addition to any HND pass at credit level in any accredited Nigerian Polytechnic in any area of specialization mentioned above.

b) Master of Technology (M.Tech) Industrial Design

Candidate must possess any of the following qualifications in addition to satisfying the general University regulation for admission.

- i. B.Tech in Industrial Design or Applied Art in any of the optional areas of specializations mentioned above with a minimum of second class honours of the Federal University of Technology, Akure or any equivalent degree in Industrial Design or Applied Art from a reputable University in Nigeria or other places.
- ii. Postgraduate Diploma in Industrial Design of the Federal University of Technology, Akure with a minimum of Upper Credit, in addition to any HND pass at credit level in any accredited Nigerian Polytechnic in any area of specialization mentioned above.

c) Doctor of Philosophy (Ph.D) in Industrial Design

The degree of Doctor of Philosophy in Industrial Design of the University of Technology, Akure is principally by research. Candidate must possess any of the following qualifications in addition to satisfying the general University regulation for admission.

- i) M.Tech degree in Industrial Design of the Federal University of Technology, Akure;
- ii) Equivalent Master's Degree in Industrial Design/Industrial Art or Applied Arts of recognized Universities;
- iii) A research proposal of about 400 typewritten words stating emphatically the research and proof of ability to pursue independent advanced research in the field of study;
- iv) Candidates below an overall grade of B at Master's degree level are not eligible for admission as there are no pre-doctoral programme.

DURATION OF THE PROGRAMMES

- a) Postgraduate Diploma in Industrial Design (PGD IDD): The course shall be on part-time basis and will run for three (3) academic semesters.
- b) Master of Technology (M.Tech) Industrial Design:

Full time students shall normally be required to spend between eighteen (18) and twenty-four (24) months.

- c) Doctor of Philosophy (Ph.D) in Industrial Design:
The duration of the Ph.D programme will be for a minimum period of 6 semesters for full-time or 8 semesters for a part-time beyond the Master's degree duration.

REQUIREMENTS FOR GRADUATION

- a) Postgraduate Diploma in Industrial Design (PGD IDD)
Candidates must complete a total of 44 units which consists of 32 units of course-work and 12 units of project work. The project work, which is actualized in the 3rd semester, will be supervised by academic members of staff and project report shall be assessed.

b) Master of Technology (M.Tech) Industrial Design

Candidates must complete a total of 38 units including project work which is 3 units in the 2nd semester. These are designated in the three areas of specialization. The project work is supervised by at least one supervisor who is not below the rank of a lecturer I and a have Ph.D.

Doctor of Philosophy (Ph.D) in Industrial Design

The Ph.D degree is awarded mainly in recognition of the candidates' high scholastic ability in his area of research. The product of the research must make some significant contribution to knowledge. Every candidate for a research degree must present a thesis based on his/her research. A thesis must show familiarity with previous work in the field of study and must demonstrate credible original result, all of which must be presented in good literacy style. A thesis is normally required to be candidate's original contribution to knowledge or to practice in the candidate's field.

COURSE OUTLINE

A) POSTGRADUATE DIPLOMA IN INDUSTRIAL DESIGN (PGD IDD)

First Semester

All courses in this semester are compulsory for all the three options i.e. Ceramics, Graphics & Textiles

Course Code	Course Title	L	T	P	U
IDD 701	Industrial Design Organizations and Management	1	1	0	2
IDD 703	General Drawing	0	0	6	2
IDD 705	History & Philosophy of Industrial Design	1	1	0	2

IDD 707	Research Methods	1	1	0	2
IDD 709	Interior Design & Decoration	1	1	0	2
IDD 711	African Crafts & Design	2	1	0	3
IDD 713	Prototype Design For The Industry	1	1	3	3
	TOTAL	7	7	9	16

First Semester Graphic Option (PGD)

Course Code	Course Title	L	T	P	U
IDD 701	Industrial Design Organizations and Management	1	1	0	2
IDD 703	General Drawing	0	0	6	2
IDD 705	History & Philosophy of Industrial Design	1	1	0	2
IDD 707	Research Methods	1	1	0	2
IDD 709	Interior Design & Decoration	1	1	0	2
IDD 711	African Crafts & Design	2	1	0	3
IDD 713	Prototype Design For The Industry	1	1	3	3
	TOTAL	7	7	9	16

Second Semester Ceramics Option (PGD)

Courses in this semester are based on student's option (Ceramics)

Course Code	Course Title	L	T	P	U
IDD 702	Ceramic History	2	0	0	2
IDD 704	Industrial/Ceramic Studio	0	1	3	2
IDD 706	Studies of Glaze and Enamel	1	0	3	2
IDD 708	Kilns/Furnaces	1	0	3	2
IDD 710	Advanced Design Studio	0	1	6	3
IDD 712	Special Project on Field Survey in Ceramics Design	0	0	6	3
IDD 730	Architectural Ceramics/Sculpture	0	1	3	2
	TOTAL	4	3	24	16

Third Semester Ceramics Option (PGD)

Courses in this semester are compulsory for all students in their various options

Course Code	Course Title	L	T	P	U
IDD 743	Project Critic Development	0	0	9	3
IDD 745	Seminar In Studio Practices	0	0	9	3
IDD 799	Practical Project In Ceramics, Graphics And Textiles Options	0	0	18	6
	TOTAL	0	0	36	12

Second Semester Graphics Option (PGD)

Courses in this semester are based on student's option (Graphics).

Course Code	Course Title	L	T	P	U
IDD 714	Graphic Illustration	2	0	3	2
IDD 716	Graphic Design Studio, Publicity And Advertising	1	0	3	2
IDD 718	Computer Application To Graphics	0	1	3	2
IDD 720	Repromethods (Print Making)	0	1	3	2
IDD 712	Special Project On Field Survey In Graphics Design	0	0	9	3
IDD 732	Printing Production And Manufacturing Processes	0	1	6	3
IDD 734	Publicity And Advertising	1	0	3	2
	TOTAL	3	3	30	16

Note: Total units to be completed by Postgraduate Diploma students as requirement for graduation in Ceramics Section

Third Semester Graphics Option (PGD)

Courses in this semester are compulsory for all students in their various options

Course Code	Course Title	L	T	P	U
IDD 743	Project Critic Development	0	0	9	3
IDD 745	Seminar In Studio Practices	0	0	9	3
IDD 799	Practical Project In Ceramics, Graphics And Textiles Options	0	0	18	6
	TOTAL	0	0	36	12

Note: Total units to be completed by Postgraduate Diploma students as requirement for graduation in Graphics Section.

First Semester Textile Option (PGD)

Course Code	Course Title	L	T	P	U
IDD 701	Industrial Design Organizations and Management	1	1	0	2
IDD 703	General Drawing	0	0	6	2
IDD 705	History & Philosophy of Industrial Design	1	1	0	2
IDD 707	Research Methods	1	1	0	2
IDD 709	Interior Design & Decoration	1	1	0	2
IDD 711	African Crafts & Design	2	1	0	3
IDD 713	Prototype Design For The Industry	1	1	3	3
	TOTAL	7	7	9	16

Second Semester Textiles Option (PGD)

Courses in this semester are based on student's option (Textiles)

Course Code	Course Title	L	T	P	U
IDD 722	Textile Industry Management	2	0	0	2
IDD 724	Computer Application in Textile Design	1	1	3	2
IDD 726	Textile Design Studio	1	1	3	2
IDD 728	Fibre Technology	1	1	3	2
IDD 712	Special Project on Field Survey in Textiles Design	0	0	9	3

IDD 736	Fashion History And Production	1	0	3	3
IDD 738	Printed and Dyed Textiles	1	0	3	2
	TOTAL	7	3	24	16

Third Semester: Courses in this semester are compulsory for all students in their various options

Course Code	Course Title	L	T	P	U
IDD 743	Project Critic Development	0	0	9	3
IDD 745	Seminar in Studio Practices	0	0	9	3
IDD 799	Practical Project in Ceramics, Graphics and Textiles Options	0	0	18	6
	TOTAL	0	0	36	12

Note: Total units to be completed by Postgraduate Diploma students as requirement for graduation in Textiles Section = 44

COURSE SYNOPSSES (PGD)

IDD 701: Industrial Design Organizations and Management (2 Units)

Encompasses the processes, business decisions, and strategies that enable innovation and create effectively-designed products, services, communications, environments, and brands. How do these factors enhance quality of life from Industrial Design approach (Solving and find desirable solutions for complex problems, drawing upon logic, imagination, intuition, and systemic reasoning, to explore possibilities of what could be done to create desired outcomes that benefit the end users). Organization and management strategies that encourages development of local professionals. Overview Federal decree enacted to strengthen the institution of professional bodies, organizations, societies and associations and also strengthen the process of certification (with Corporate Affairs Commission); their roles in advancement of professions; membership rights and their functions.

IDD 702: Ceramic History (2 Units)

History of materials, equipments and production methods in pottery and ceramic technology. High-level conceptualization of problems and solutions in ceramics. Ceramics styles and trend in industrial developments in

Nigeria.

IDD 703: General Drawing

(1) Drawing From Objects

Students are expected to select various objects for rendition in their sketch pads and course assignments as guided by lecturers. Angular objects with shapes of different dimension and sizes are expected in the course work.

These include:

- Junk items
- Broken furnitures
- Dilapidated buildings
- Accident vehicles and
- Concrete irons

Drawing From Posed Models

Models are expected to be studied, observed and rendered in different drawing media. Usage and ownership of sketch pads are essential.

IDD 704: Industrial/Ceramic Studio (2 Units)

Studio exercises in creative thrown pottery for decoration and utility. Exploration of body decoration in various methods such as spraying and engob-decoration. Production of functional and cost-effective proto-types for industrial production.

IDD 705: History and Philosophy of Industrial Design (2 Units)

Students will be exposed to the works of design/artists through the ages. How design have been influenced by earlier artists, past styles and the characteristics of past eras, designers and visual communicators. The course will examine design history for inspiration and the significant eras in design history as well as Visual Language of Design. The activities of design movements of 20th Century such as the Arts and Crafts Movement; Art Nouveau; Dadaism; Modernism; Futurism; Bauhaus; Art Deco; and Post Modern Design. The design principles of the various movements and their influence of product design will be discussed.

IDD 706: Studies of Glaze and Enamel (2 Units)

Acquisition of knowledge and skills in glaze compounding and glaze process for both studio and industrial works.

IDD 707: Research Methods (2 Units)

This course will provide an opportunity for students to establish or advance their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, and mixed methods approaches. Students will use these theoretical underpinnings to critically review literature relevant to their field or interests and determine how research findings are

useful in informing the understanding of their environment (work, social, local, global). Specifically students will: understand research terminologies, aware of the ethical principles of research, ethical challenges and approval processes; Describe quantitative, qualitative and mixed methods approaches to research; Identify the components of a literature review process; Critically analyze and report published research.

IDD 708: Kiln/Furnaces (2 Units)

Kiln architecture and principles. Kiln construction and maintenance. Kiln repairs and maintenance. Kiln firing.

IDD 709: Interior Design And Decoration

Part one of the course shall explore the historical content of traditional and modern interior decorations in Africa and beyond. A term paper is expected to be submitted by individual student as a fulfillment for the completion of the course. The key actors and master designers in interior decoration profession shall be appraised vis-à-vis their contributions to the world of Interior Design and Decoration.

Part two of the programme would require the students to choose specific items of interior decoration unique to their specialization and the profession for production. The prototype presentation in any aspect of interior decoration shall attract marks that are commensurable to each object.

IDD 710: Advanced Design Studio (3 Units)

Exposure to design process in the ceramic studio environment from conceptualization to implementation.

IDD 712: Projects (6 Units)

Execution of special project in Ceramics, Graphics and Textiles Design that requires topic expression of field experience that is demonstrated on special studio project with advanced skills. Studio projects must be completed by written reports and exhibition.

IDD 722: Textile Design Management

Introduction to feasibility studies of small and medium scale textile industries. Production planning and economic use of resources. Textile merchandising and marketing. Application of technology to textile design. Understand the importance of professionalism, effective communication and critical reasoning in the textile industry.

IDD 724: Computer Application In Textile Design

Application of principles of elementary digital design skills using Corel Draw/Adobe photo shop/Adobe Illustration. Translation of design ideas into computer rendering, presentation and production of textile prototypes. Creative use of software to produce quality textile design repeats for reproduction purposes.

IDD 726: Textile Design Studio

Students are to study the principles of design and colour, concept of structure and space in two-dimensional (2D) project. Creative use of elements and principles of design to produce surface design for wearable and furnishing fabrics. Development of motifs and use of repeat techniques for textile design.

IDD 728: Fibre Technology

Definition of fibre technology, classification and uses of fibres, production of synthetic fibres and yarn production. Physical and chemical properties of fibre. Fibre finishing and basic fabric construction.

IDD 736: Fashion History And Production

An introduction course in the History of Fashion Evolution, highlighting styles of specific time periods in History. Discussion on various trends and styles in vogue. Students are to study design for men, women and children. Importance of fashion accessories and embellishment. Future prospects of fashion industry in Nigeria. Basic pattern drafting and translation into garments.

b) MASTER OF TECHNOLOGY (M-TECH) INDUSTRIAL DESIGN

COURSE OUTLINE

First Semester (General Core Courses)

Course Code	Course Title	L	T	P	U
IDD 801	Survey Seminar on Concept and Philosophy of Industrial Design (Art theory & practices)	3	0	0	3
IDD 803	General Drawing (Practical)	0	0	3	3
	Total	3		3	6

Ceramics Option (1st Semester)

Course Code	Course Title	L	T	P	U
IDD 811	Advanced Ceramics Workshop Practice (Throwing and Hand Building)	0	0	3	3
IDD 813	Methods and Materials in Ceramics (Utility Studies and Mass Production Techniques) - Materials Science	3	0	0	3

Electives (at least minimum of 3 credits units per Semester)

Course Code	Course Title	L	T	P	U
IDD 821	Computer Graphics appreciation (Package Design, Promotional Design and Advertising)	2	0	1	3
	Total	5	0	4	9

Graphics Option (1st Semester)

Course Code	Course Title	L	T	P	U
IDD 821	Computer Graphics appreciation (Package Design, Promotional Design and Advertising)	2	0	1	3
IDD 823	Creative Photography (Methods and Materials)	2	0	1	3
	Electives	0	0	0	3
	TOTAL	4	0	2	9

Electives (at least minimum of 3 credits units per Semester)

Course Code	Course Title	L	T	P	U
IDD 831	Textile Dyeing and Dyestuff	3	-	-	3

Textiles Option (1st Semester)

Course Code	Course Title	L	T	P	U
IDD 831	Textile Dyeing and Dyestuff	3	0	0	3
IDD 833	Methods and Materials Studies in Textile Technology	3	0	0	3

Electives (at least minimum of 3 credit units per Semester)

Course Code	Course Title	L	T	P	U
IDD 832	Advanced Textile Design and Printing	3	-	-	3
IDD 834	Design in Textile Industry	3	0	0	3
	TOTAL	6	0	0	6

Electives (at least minimum of 3 credit units per Semester)

Course Code	Course Title	L	T	P	U
IDD 821	Computer Graphics appreciation (Package Design, Promotional Design and Advertising)	2	-	1	3
	Total	8	-	1	9

CORE COURSES

General Courses For 2nd Semester

Course Code	Course Title	L	T	P	U
IDD 802	Research Method	3	0	0	3
IDD 804	Thesis/Research Proposal	3	0	0	3
	Total	6	0	0	6

Ceramics Option (2nd Semester)

Course Code	Course Title	L	T	P	U
IDD 810	Survey Seminar on Pottery through the Ages	3	0	0	3
IDD 812	Firing, Glazing and Glazes	0	0	3	3
IDD 814	Prototype Design for Ceramic Industry (Kiln Construction and Development)	1	0	0	3

Textiles Option (2nd Semester)

Course Code	Course Title	L	T	P	U
IDD 834	Textile Design Industry	3	0	-	3
IDD 832	Advanced Textile Design and Printing	3	0	-	3
IDD 830	Survey Seminar on Weaving Loom Construction and Development	3	0	-	3

ELECTIVE (at least minimum of 3 credit units per Semester)

Course Code	Course Title	L	T	P	Units
IDD 812	Firing Glazing And Glazes	2	0	1	3
IDD 824	Advanced Printmaking Woodcut and Etching (Metal and Plastic Etching and Design)	0	0	3	3
	Total	8	0	1	15

Third Semester

Project for all M.Tech Students, (Ceramics, Graphics & Textiles)

Course Code	Course Title	L	T	P	U
IDD 899	Master's Thesis Research Project	0	-	-	12

COURSE SYNOPSSES (M.TECH)

Ceramics Option

IDD 801: Concept and Philosophy of Industrial Design

This course will examine the origin and evolution of material culture in man from paleolithic age to the 20th century. The main contents being the early man and tools improvisation, evolution of pottery and weaving. The development of building materials and construction through the ages, 18th century Industrial Design in the modern era. Various components of Industrial Design will be examined through team work.

IDD 802: Research Methodology

This includes general theoretical concepts of conducting scientific research as well as formal and logical methods of writing. Use of library and reviewing literature will be examined. Methods of conducting pilot study and preparing a formal thesis proposal will be discussed.

IDD 803: General Drawing

An experimental drawing activity of practical exploration will be examined. The emphasis is on the development and advancement of technical manipulative skills and Graphics Communication of perceived objects – with mastery of media firm structural rendition and composition.

IDD 804: Proposal Seminar – Thesis

IDD 810: Pottery Through The Ages

Origin of Pottery. Traditional Ceramics in Africa. Oriental Ceramics, 18th century. Ceramic in Europe and Industrial Revolution. This course provides the opportunity of acquiring the knowledge of historical development of ceramic production through the ages.

IDD 811: Advanced Ceramics Workshop Practice

Throwing of large vases. Hand building of vases. Ceramic sculpture. Architectural ceramics: Production of floor and tiles and mosaic tiles. Production of sanitary wares.

IDD 812: Advanced Industrial Ceramics

Production of moulds and casting; preparation of plaster of – Paris ($\text{CaSO}_4 \frac{1}{2} \text{H}_2\text{O}$) from the mineral gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$). The making of positive and negative moulds.

Formation of casting slip: the mechanism of slip formation. The basic factors governing plasticity. Advanced methods of shaping in the plastic (solid) state:

- a. Jigging and jollying
- b. Forming by roller machines
- c. Plastic pressing or "Ram Pressing"
- d. Impact forming
- e. Injection moulding

IDD 813: Materials Studies In Ceramic

Study of raw materials for ceramic production (6 weeks):

- Clays
- Ceramic oxides (silica, Alumina, feldspars, etc.)
- Colouring oxides; antimony oxide cobalt, copper, iron oxides, tin oxide, manganese oxide, rutile.

Study of types and locations of ceramic materials available in Nigeria (3 weeks). Exploration (visit to the location) of ceramic raw materials available within the student's vicinity (collection of two to five samples of ceramic materials will be sufficient). (3 weeks independent study).

IDD 814: Advanced Studies in Ceramic Glazes

Formation of: Earth ware glazes, Stoneware glazes

- Porcelain glazes
- Ash glazes
- Salt glazes
- Methods of glaze application
- Glaze aspects.

IDD 815: Ceramics Management and Marketing, Study into Equipment for Pottery Production

Understanding a mechanism of ceramic equipment such as throwing wheels, kilns, ball mill, pug mill, crushers, plungers, spraying machine.

- Feasibility study for establishing ceramic industry
- Exploration into ceramic industries available in students vicinity

Graphics Option

IDD 820: Film, Animation And Television Technology

Theory and practice of film, filming design structures and criteria. Experiments in film animation, television production in Graphics and text formatting in Television. The role of hand written letterings and computer made fonts in computer graphics, colour consideration on TV screen. Cartons and animation presentation.

IDD 821: Computer Graphics

Adequate knowledge of Computer Aided Design (CAD)

especially in areas of Corel Draws and Design packages. Extraction and adoption of materials for use in computer. Studies in Internet formation and illustration of poster designs, handbills and general advertisement. Adaptation of the CAD experiences for textile designers who chose the course as electives.

IDD 822: Printing Technology

General appreciation, theory and practice of printing machine operation, book packaging and finishing, text studies and readership culture.

IDD 823: Creative Photography

The study of methods and materials in photography. The use of photography as a graphic communication medium. The theories and practices of artistic creation and expression in photography. Photography as an aspect of visual design and art of documentation. The study of new trends and developments in camera production and manipulation. The camera as a modern equipment for artistic creative developments.

IDD 824: Advanced Printmaking

The course will explore various methods of printmaking such as advanced lithography, advanced intaglio methods, advanced serigraphy and advanced relief methods. Etching wood cut and metal plastic design. Student should select, at least one of the options and experiment with the character of the medium and the techniques in a way that the result can enhance his creativity and technical proficiency.

Textiles Design Option

IDD 830: Survey Seminar on Weaving, Loom Construction and Development

This course aims at preparing students for challenges in traditional and modern weaving technologies. The study of the theoretical framework of weaving culture in Nigeria/Regional/ Ethnic/Cultural levels and the world at large will bring into focus some aspects of production existing in the craft. The study of looms and construction methods of varieties will provide dynamic ideas for the development of new types and accessories. Extensive literature search of the weaving culture and the industry is required.

IDD 831: Textile Dyeing And Dyestuffs

Textile dyeing methods and the study of the use of dyestuffs in many part of the world. Practical and studio requirements of varieties of experimentation in dyeing and the ability of the students to use varieties of dyestuffs on variant fibres and fabrics. Designing will go along with the Dyeing. Extensive study and practice with different grades and brands of synthetic and cotton dyes, industrial dyes and the application of mordant and other chemicals.

IDD 832: Advanced Textile Design And Printing

Lectures will explore varieties of textile paper designs and simulations for fabric printing projects. Independent studies in colourations, decorations and embellishments of fabrics of various grades and textures. Advanced printing table practice and presentation of printed simulations for use in Textile industries. Blackout and Design transfer methods will be revisited and highlighted. Motifs formation and creation will complement the modern method of design transfer through computer to the exposure in darkroom, using photographic method.

IDD 833: Methods And Materials Study In Textile Technology

This course is an investigation into local sources and manufactures of dyes wax as a medium of textile decoration and other useful materials in textile production. Emphasis will be laid on how students can create, re-create or improve textile working tools and materials for effective production in studios and cottage industries. Design of prototypes of simple textile equipments that can assist fabric decoration will be encouraged.

IDD 834: Design In Textile Industry

Lectures in the course will focus on the working conditions in the Textile Industries. The combined functions of various departments in the Industry will be emphasized. Managerial structures and Industrial Relations will be focused. Merchandise and product advertisement structures will be under this study. Reports and progress of textile industry will be measured by the level of student's interactions with various segments of the textile industry.

IDD 899: Master's Thesis Research Project 12

C)Doctor of Philosophy (Ph.D) Industrial Design

IDD 999: Doctoral Research Project

The degree of the Doctor of Philosophy in Industrial Design of the Federal University of Technology, Akure is principally by research. However, where candidates' Transcripts for Master's Degree show deficiency in relevant courses that are needed to improve the quality of work required for graduation in the Doctor of Philosophy in Industrial Design, such candidates shall be made to take audited courses at Masters level when admitted. Such audited courses should be offered and passed by the candidates before the commencement of their research topics for the Doctoral programme. Students' supervisors working in conjunction with the Postgraduate Committee of the Department should agree on the rectification of such deficiencies in relevant courses. However, the discretion of the supervisors is paramount in this process.

LIST OF POSTGRADUATE LECTURERS

S/N	SURNAME	QUALIFICATION	STATUS	AREA OF SPECIALIZATION
1	Prof. I. B. Kashim	B. A., M. A., Ed. (ABU) Ph.D (FUTA)	Professor/HOD	Industrial Ceramics, Utility Studies & Mass Production Techniques, Firing, Glazing & Glasses, Kiln Construction and Development
2	Prof S.R. Ogunduyile	B. A., M. A., Ph.D (ABU)	Professor	Textiles Design, Textile Dyeing & Dyestuffs, Textile Methods & Materials, Textile Printing
3	Prof. E. B. Ojo	B. A., MFA (Benin), Ph.D (FUTA)	Professor	Textiles Theories & Techniques, Textile Weaving, Textile Industry & Merchandize
4	Prof. T. L. Akinbogun	B. A. (Benin), M. A. (ABU), Ph.D (FUTA)	Professor	Ceramics Throwing and Hand Building, Survey Seminar of Pottery through the Ages
5	Dr. D. O. Makinde	BA (Hons.), MFA (Ife) & Ph.D (Nsuka)	Reader	Textiles
6	Dr. E. B. Oladumiye	NCE, B. A. (ED), MF A., Ph.D(Akure)	Senior Lecturer	Printmaking, Design, Etching, Illustration, Layout & Advertising, Graphic Design
7	Dr. O. F. Kayode	NCE, B. A., M.Tech., Ph.D (FUTA)	Senior Lecturer	Commercial Entrepreneurship, Printing, Technology,Digital Advertising and Entrepreneurship Education. Research Methods & Photography
8	Dr. (Mrs.) M. O. Areo	BA (Hons.), MFA (Ife) & Ph.D (Ogbomosho)	Senior Lecturer	Textile and Art History
9	Dr. O. A. Fatuyi	B.A, (ABU), MFA (Benin), Ph.D (Ogbomosho)	Lecturer I	Prototype Development in throwing & Modeling
10	Dr. (Mrs.) B. E. Adiji	B.A, (ABU), M.Tech & Ph.D(Akure)	Senior Lecturer	Textiles
13	Dr. T. I. Ibiwoye	B.Tech. (Bauchi), M.Tech & Ph.D(Akure)	Lecturer I	Graphics Design
15	Dr. O. S. Adelabu	B.Tech., M.Tech (Akure), Ph.D (Japan)	Lecturer II	Ceramic Technology
16	Dr. T. S. Ogundare	B.Tech., M. Tech & Ph.D(Akure)	Lecturer II	Ceramic Technology

9.3.4 DEPARTMENT QUANTITY SURVEYING (QSV)

1. AVAILABLE OPTIONS/ SPECIALIZATIONS

- a. Postgraduate Diploma (PGD) with specialization in:
 - (i) Quantity Surveying
 - (ii) Construction Management
- b. Master of Technology (M. Tech) with specialization in:
 - (i) Quantity Surveying
 - (ii) Construction Management
- c. Doctor of Philosophy (Ph. D) with specialization in:
 - (i) Quantity Surveying
 - (ii) Construction Management

2 PHILOSOPHY AND OBJECTIVES

- a. Postgraduate Diploma (PGD) programmes

(i) Quantity Surveying

The discipline of Quantity Surveying like any other discipline in the field of Environmental studies is never static and its dynamic nature demands a continuous update of what can be referred to as the body of Quantity Surveying knowledge. The philosophy of this postgraduate programme is to create an enabling climate of interaction between those candidates who have acquired professional experience with limited academic exposure and those graduates in Quantity Surveying and cognate disciplines who may not have gone through the rigors of practical experience. This it is envisaged will produce a blend of Quantity Surveyors who will function effectively as cost advisers and financial managers in the various requirements of the construction industry such as building, civil and engineering projects. To this end, the objectives of the programme are to:

- (i) Provide an opportunity for advanced knowledge in Quantity Surveying for those in practise without going through formal postgraduate degrees.
- (ii) Help those who may wish to make up their deficiencies in their first degrees especially to be able to pursue higher degree programmes.
- (iii) Bridge the gap between the Higher National Diploma and first degree in Quantity Surveying in order to allow the former to pursue higher degree programmes and also qualify them for registration with the Quantity Surveyors Registration Board of Nigeria (QSRBN).

(ii) Construction Management

The need to produce a pool of well-seasoned professionals for effective management of the construction industry in order to improve its performance and make significant contributions to the Nigerian economy cannot be over-emphasized. Various professionals are involved in the delivery of construction projects from conception to completion and anyone of these professionals may be appointed to the positions of project/construction manager as may be deemed fit by the employer

especially as is the practice in the industry in Nigeria. In view of this, all these various professionals need a continuous update and development of their knowledge of management practices and new innovations in the industry in order to be able to face these challenges.

The philosophy of the programme therefore is to improve the knowledge of construction professionals in the management of all forms of infrastructural developments. The objectives of the programme are to:

- (i) Help those who may wish to make up their deficiencies in their first degrees especially to be able to pursue a higher degree programme in construction management.
- (ii) Bridge the gap between the Higher National Diploma and first degree in construction related disciplines in order to allow the former to pursue a higher degree programme in construction management.
- (iii) Produce a crop of well seasoned construction managers that can function effectively well for speedy delivery of construction projects.

b. Masters of Technology (M. Tech) / Doctor of Philosophy (PhD) programmes

Quantity Surveying and Construction Management provide a comprehensive cost and managerial control of all activities in the construction sector of any nation's economy. There is therefore the need to continue to train professionals in these areas to meet these challenges of a growing industry. The construction management option is to equip professionals working in the construction industry to play an effective role in managing construction activities at both the design and construction stages.

The specific objectives of the programmes are to:

- (i) Provide advanced academic courses for students who want to undertake further studies and research in Quantity Surveying/Construction Management.
- (ii) Develop a more comprehensive body of knowledge for higher degree programmes in Quantity Surveying through research which the profession has been lacking over the years.
- (iii) Meet the manpower requirements for teaching and research especially in Quantity Surveying.
- (iv) Establish research areas which will lead to the improvement of design, management and maintenance methods for construction projects.

ADMISSION REQUIREMENTS

- a. Postgraduate Diploma (PGD) programmes

Candidates for admission to the programme should possess any of the following qualifications:

Quantity Surveying

- (i) B. Tech in Quantity Surveying/ Building or its equivalent.
- (ii) HND at credit level in Quantity Surveying/ Building or its equivalent from a recognized Polytechnic or College of Technology.

Construction Management

- (i) B. Tech in any of Quantity Surveying, Building, Architecture, Estate Management and Civil Engineering or its equivalent.
- (ii) Higher National Diploma (HND) at Credit level in any of Quantity Surveying, Building, Architecture, Estate Management and Civil Engineering or its equivalent from a recognized Polytechnic or College of Technology.
- (iii) Corporate members of the Nigerian Institute of Quantity Surveyors (MNIQS) and Nigerian Institute of Building (MNIQB) with cognate experience of not less than 3 years in the construction industry.

b. Masters of Technology (M. Tech)

Candidates must possess any of the following qualifications in addition to satisfying the general University regulation for admission:

Quantity Surveying

- (i) B. Tech in Quantiy Surveying/ Construction Economics with at least Second class Honours of the Federal University of Technology, Akure or its equivalent
- (ii) PGD in Quantity Surveying of the Federal University of Technology, Akure or its equivalent with a minimum overall CGPA of 3.50

Construction Management

- (i) B. Tech in Quantity Surveying/ Building/ Architecture/ Estate Management/ Civil Engineering with at least Second Class Honours of the Federal University of Technology, Akure or its equivalent.
- (ii) PGD in Quantity Surveying/ Building/ Construction Management with a minimum of Upper credit of the Federal University of Technology, Akure or equivalent with a minimum overall CGPA of 3.50.

c. Doctor of Philosophy (Ph.D) programme

Quantity Surveying

Candidates must have M.Tech degre in Quantity Surveying/ Construction economics of the Federal University of Technology, Akure or its equivalent with a minimum overall CGPA of 3.50. The candidate may also be required to have scored not less than 60% in the oral thesis examination.

Construction Management

Candidates must have M. Tech degree in Construction Management, Quantity Surveying or Construction Economics of the Federal University of Technology, Akure or its equivalent with a minimum of overall CGPA of 3.50. The candidate may also be required to have scored not less than 60% in the oral thesis examination.

DURATION OF PROGRAMMES

- a. Postgraduate Diploma (PGD) programmes

The programme will be a minimum of three (3) academic semesters on full time basis.

- b. Masters of Technolgy (M. Tech) programmes

Full Time: minimum of 18 months and maximum of 24 months

- c. Doctor of Philosophy (PhD) programmes

Full Time: minimum of 36 months and maximum of 48 months

Part Time: minimum of 48 months and maximum of 60 months

Upon application, Senate may approve an extension where necessary.

REQUIREMENTS FOR GRADUATION

- a. Postgraduate Diploma (PGD) Programmes

Candidates must complete a total of 37 units and 34 units of course work for Quantity Surveying and Construction Management respectively and 6 units of Research work. The research work must show an original contribution of the researcher to knowledge.

b. Master of Technology (M. Tech) Programmes

Candidates must complete a total of 33 units of course work and 12 units of research work. The research work must show an original contribution of the researcher to knowledge.

c. Doctor of Philosophy (PhD) Programmes

All candidates are expected to carry out original research projects supervised by approved postgraduate Lecturers and successfully defend same in accordance with the Postgraduate school. The Ph.D degree is awarded mainly in the recognition of the candidate's high scholarly ability in his area of research. The product of the research must form a definite contribution to knowledge.

POSTGRADUATE PROGRAMME

- a. Postgraduate Diploma (PGD) Programmes

Quantity Surveying

First Semester

Course Code	Course Title	L	T	P	U
QSV 701	Advanced Building Measurement and Specialization	3	0	0	3
QSV 703	Construction Technology and Services	2	0	3	3
QSV 705	Development Economics	2	0	0	2

QSV 707	Operations Research in Construction	2	0	0	2
QSV 709	Construction Tendering and Estimating	2	0	0	2
QSV 711	Contract Law and Administration	2	0	0	2
QSV 713	Research Methodology and Seminar Proposal	0	0	6	2
	Total				16

QSV 711	Contract Law and Administration	2	0	0	2
QSV 713	Research Methodology and Seminar Proposal	1	0	3	2
QSV 723	Introduction to Construction Management	2	1	0	3
QSV 725	Construction Codes and Regulations	2	0	0	2
	Total				16

Second Semester

Course Code	Course Title	L	T	P	U
QSV 702	Measurement of Electrical and Mechanical services	3	0	0	3
QSV 704	Construction Technology and Materials	2	0	3	3
QSV 706	Construction Management and procedures	2	0	0	2
QSV 708	Project Management	2	0	0	2
QSV 710	Cost Control	2	0	0	2
	Total				12

Second Semester

Course Code	Course Title	L	T	P	U
QSV 704	Construction Technology and Materials	2	0	3	3
QSV 708	Project Management	2	0	0	2
QSV 712	Construction Scheduling	2	1	0	3
QSV 714	Budgeting and Financial Control	2	0	0	2
QSV 716	Human Resources Management in Construction	2	0	0	2
	Total				12

Third Semester

Course Code	Course Title	L	T	P	U
QSV 799	PGD Research Project	0	0	9	6

Third Semester

Course Code	Course Title	L	T	P	U
QSV 721	Information Technology in Construction	1	0	3	2
QSV 727	Construction Plants and Equipment	2	0	0	2
QSV 729	Maintenance Technology and Management	1	0	3	2
QSV 731	Quality Control in Construction	2	0	0	2
	Total				8

Construction Management

First Semester

Course Code	Course Title	L	T	P	U
QSV 703	Construction Technology and Services	2	0	3	3
QSV 707	Operations Research in construction	2	0	0	2
QSV 709	Construction Tendering and Estimating	2	0	0	2

Course Code	Course Title	L	T	P	U
QSV 799	PGD Research Project	0	0	9	6

Master of Technology (M. Tech) programmes

Quantity Surveying

First Semester

Course Code	Course Title	L	T	P	U
QSV 801	Measurement and Costing of Construction works	3	0	0	3
QSV 803	Advanced Cost Control	3	0	0	3
QSV 805	Applied Research methods	3	0	0	3
QSV 807	Value management	3	0	0	3
Electives (6 Units of Electives)					
QSV 809	Project Psychology	3	0	0	3
QSV 811	Strategic Construction Procurement	3	0	0	3
QSV 825	International Management Issues in Construction	3	0	0	3
Total					18

Second Semester

Course Code	Course Title	L	T	P	U
QSV 802	Construction estimating and logistics	3	0	0	3
QSV 804	Applied Contract Law and Administration	3	0	0	3
QSV 806	Project Risk management	3	0	0	3
QSV 820	Advance Project Management	3	0	0	3
Electives (3 Units of Electives)					
QSV 808	Operation Research Applications	3	0	0	3
QSV 822	Financial Management in Construction	3	0	0	3
QSV 824	Project Performance Measurement	3	0	0	3
Total					15

Course Code	Course Title	L	T	P	U
QSV 899	PGD Research Project	0	0	18	12

Construction Management

First Semester

Course Code	Course Title	L	T	P	U
QSV 805	Applied Research methods	3	0	0	3
QSV 821	Advanced Management studies	3	0	0	3
QSV 823	Management of Design & Construction	3	0	0	3
QSV 825	International Management Issues in Construction	3	0	0	3
Electives (6 Units of Electives)					
QSV 809	Project Psychology	3	0	0	3
QSV 827	Organisation Change	3	0	0	3
QSV 829	Management of Construction Materials and Plants	3	0	0	3
Total					18

Second Semester

Course Code	Course Title	L	T	P	U
QSV 804	Applied Contract Law and Administration	3	0	0	3
QSV 820	Advance Project Management	3	0	0	3
QSV 822	Financial Management in Construction	3	0	0	3
QSV 824	Project Performance Measurement	3	0	0	3
Electives (3 Units of Electives)					
QSV 808	Operation Research Applications	3	0	0	3
QSV 826	Human Resources Management	3	0	0	3
QSV 828	Planning and Operation of Production System	3	0	0	3
Total					15

Course Code	Course Title	L	T	P	U
QSV 899	PGD Research Project	0	0	18	12

Doctor of Philosophy (Ph.D) Programmes

Course Code	Course Title	L	T	P	U
QSV 999	PhD Research Project	-	-	-	-

COURSE SYNOPSIS

A. POSTGRADUATE DIPLOMA (PGD) PROGRAMMES

QSV 701 Advanced Building Measurement & Specification 3 Units

A general overview of the measurement of building works. Measurement of building elements using complex drawings such as high-rise buildings, External works, Structural steel works, Building specification.

QSV 702 Measurement of Mechanical & Electrical Services 3 Units

Measurement of Plumbing Installation, Drainage works, heating installations, gas installation, Compression air installation, fire fighting, mechanical movement systems and other associated builder's works. Electrical installation. Ventilation and air-conditioning, Communication and Security Systems, Refuse disposal installations.

QSV 703 Construction Technology & Services 3 Units

Site preparation- Dewatering and soil stabilization, Anchorage, Heavy foundations- Raft, grillages, piling systems, Basement, Underpinning, retaining and diaphragm walls, Floors and Roofs for complex structures. Production and fabrication of steelwork. Precast and prestressed construction. Industrialized system building. Electrical Installation, ventilation and air conditioning, mechanical movement systems. Fire protection.

QSV 704 Construction Technology and Materials 3 Units

Civil engineering construction- Road pavement, bridge, dams, harbour works, Rail track, Airport, Tunnelling, Sewage treatment intallation.t.c. Communication system, structural timber, concrete technology, innovation in construction materials and use of local materials.

QSV 705 Development Economics 2 Units

Aims of public and private developers. Factors influencing the

development process. Budgeting for private and public development. Choice and acquisition of sites and their effects on development. Feasibility studies- Developer's budget. Source of fund for development, public investement, mortgage financing, cash flow forecasting. Development bonds, loans grants, subsidy and taxation.

QSV 706 Construction Management and Procedure 2 Units

Management ideas/ thoughts. Decision making process including the use of committee system. Organisation and Accountability. Office automation. Analogue and digital computing. Personnel administration communication. Production planning and program- Bar chart, CPM etc. site management procedure, work and productivity studies. Working capital and flow of fund in the construction industry. Building materials management. Plant management.

QSV 707 Operations Research in Construction 2 Units

Linear programming, Transportation and assignment problems, programming and scheduling. Queuing theory, inventory control, Simulation models etc.

QSV 708 Project Management 2 Units

Financial Managegent-Banking System, Stock Exchange, Construction Finances, Insurance Industry and how they relate to construction. Management, Servicing and repayment of loans, methods of loans renegotiations and rescheduling. Contract procurement system vis-à-vis the project management option. Introduction to Project Management Consultancy. Qualifications, functions and responsibilities of the Project Manager. Funding and the project manager, marketing and public relations function and policies. Quantity Surveying and Project Management practice. Project management and prime consultancy compare. Evaluation of project management consultancy in Nigeria.

QSV 709 Construction Tendering and Estimating 2 Units

A critical review of the Estimating & Tendering processes. Computation of unit rates for complex building and civil engineering works. Preparation of sub-contractor's quotations-mechanical and electrical works, material manufacturing firms. Preparation of schedule of materials, labour and plant items.

QSV 710 Cost Control 2 Units

Cost implication of design variables and construction methods- a critical view. Modern estimating techniques, cost planning techniques and their practical application to typical projects. Cost-in-use studies. Investment Appraisal. Feasibility studies. Cost Benefit Analysis. Value engineering. Cost modelling.

QSV711 Contract Law and Administration 2 Units

A general overview of the principles of the law of contract, tort, property and land laws. Formation and execution of building, civil and other engineering contracts including the interpretations of the current conditions of contract in use (JCT 1980, SFBCN 1990 etc). Discrepancies between building and civil engineering contracts in terms of their conditions. FIDIC conditions. Arbitration and awards- principles, practice and interoperation of arbitration Decree NO. of 1988.

QSV712 Construction Scheduling 3 Units

Definition of scheduling : aims and advantages. The planning Techniques: Concept of planning, purpose of planning, types of planning technique, specific uses and features e.g. Bar chart, Critical Path Methods (CPM), Line of balance, Horse Blanket etc. emphasis on control tools e.g maintenance schedule, labour schedule, equipment schedule, site layout, management of subcontractors/supplying, BOQ and the budget statement. Productivity studies in the construction industry, meaning of productivity, factors affecting productivity, measurement of productivity, work study, work measurement, method study, activity study, foreman delay survey,incentives, motivation.

QSV713 Research Methodology and seminar proposal 2 Units

The course introduces student to the skills necessary to conduct vigorous and original research and effectively communicate their research findings in a clear and systematic manner. Research and the tools of research- meaning of research, type of research, tools for research. Research planning and design, planning, review of literature, nature of data/research methodology, research proposal. Research methodology. Presentation of research results. The students are expected to present two separate seminars on topical issues which may relate to their proposed research project.

QSV714 Budgeting and Financial Control 2 Units

Introduction to business organisation, financing modern business, accounting theory, cost accounting, purpose of accounting, time-value of money in financial decisions, use of profit information, working capital management, financial analysis and planning, cash flow forecasting, sources of capital, Developer's budgeting.

QSV715 Measurement of Civil Engineering Works 3 Units

Introduction of Civil Engineering measurement. The use of detailed drawings for the measurement of earthworks, retaining walls, piling systems, roads, bridges, air field, railway track, tunnels, harbor works, dams etc. Civil Engineering specification.

QSV716 Human Resources Management in construction 2 Units

Classification of construction workers into; manual workers, technicians, management ways of satisfying the training needs of the groups, consideration of welfare package, productivity and industrial relations of construction workers, recruitment procedures in the construction industry, job description and training, instructions for personnel, manpower development for personnel

QSV717 Heavy Engineering 3 Units

Units scope of heavy engineering- definition, principle and constituent of heavy engineering i.e. equipments, facilities, structures and raw materials for pharmaceutical chemicals, nuclear energy, gas exploration and production, oil exploration, production and refinery, power generation, food and drinks, paper milling, steel and non-ferrous metal production, telecommunicating, etc. procurement of engineering contracts- technological licensing and patent. Turnkey procurement method. Bidding procedures. Financing of engineering contracts-feasibility studies, letter of credit, suppliers credit, contractor financing. Measurement and control of engineering project-construction site services, scaffolding, steelworks, plants, ductwork, pipework, electrical work, instrumentation, insulation, protective covering , sundry items.

QSV719 Quantity Surveying Practice & Procedure 3 Units

Roles and responsibilities of participants to Building and Civil Engineering contracts especially the relationships between the Quantity Surveyor and others. Scope of Quantity Surveying functions from inception to completion of projects Valuation and Final Accounts procedures. Principles of professional conducts and misconducts. Conditions of engagement of the QS. Involvement of QS in different contract procurement methods. Principles of fee calculation. The future and development of Quality Surveying

QSV721 Information Technology in Construction 2 Units

Introduction to various types of computer components on a computer. The application of the computer principles and introduction; Word processing, Data base, spread sheets, Graphics, Desktop publishing integrated packages, Estimating, Cost planning and modelling, Computer Aided Design, Quantity Surveying software, Current Developments in Micro-Computing-Current trends in hardware and software technologies.

QSV723 Introduction to Construction Management 3 Units

Definition and concept of Management: management ideas/thoughts; Historical Development, Management Objectives; Policy Planning; Management Theory- Contribution of Fayol, Taylor, Gilbereth, etc. Organizational Structure, Span of control, Authority, Responsibility, Decision Making process including the use of Committee

system, Organization and Accountability, Office Automation, Parties in the construction industry, Construction Organization, Parties to Building Contract and their responsibilities.

QSV725 Construction Codes and Regulation 2 Units

Building Regulation, Building Classification, Compartmentalisation, Fire resistance Requirements on Elemental part of Buildings and unprotected areas in external walls, Constructional Requirement for separation walls, Compartment walls and floors, protected chaffs, Fire resisting doors and doors assemblies, penetration of fire barriers, non-combustibility requirements for stairways in prescribed situations provision of cavity barriers and fire stopping. Control of flame spread on walls and ceilings. The siting constraints on building and roof construction.

QSV727 Construction Plants and Equipment 2 Units

Needs for mechanical plants in the construction process, types, Uses of Mechanical Plant e.g. Forklifts, Hoists, Excavators, Earthmoving Plants etc. Methods of Assessing Performance of Plants and Cost implications, Selection Criteria, Maintenance of Equipments, Problems of Indigenous Contractors in acquiring and using Construction Equipments. Advantages and Disadvantages of Purchase and Hiring of Equipments.

QSV729 Maintenance Technology and Management 2 Units

Definition, Types and Nature of Building Maintenance. Maintenance needs, Maintenance Operation Plan Causes, Effects and Remedies of Common Building Defects e.g. Cracks, Settlement, Condensation and Dampness. Underpinning, Principles and Methods, Maintenance System, Planning and Execution of Maintenance work, Building maintenance Policy Formulation, Schedule of Dilapidation and Conditions, Survey of Building Defects, Maintenance Profiles and Manuals, Maintenance Report Writing, Specification Writing, Budgeting for Maintenance.

QSV 731 Quality Control in Construction 2 Units

Definition of Quality and Quality Control, The need for Quality Control and specification writing, Elements of Quality, factors affecting Quality (from Human and Material perspectives), Control measures in Concrete, Blocks, Mortars, Ceiling, Roofs, etc, volume batching, weight batching, cement, sand, coarse aggregate ratio, Testing of materials (cement, sand, reinforcement rods, wood, concrete using rebound hammer, sampling, etc). Quality Control from tendering procedure through selecting of contractor, Quality Control from recruitment of workers and regular/ commitment supervision, Model for Quality Assurance.

QSV 799 PGD Research Project 6 Units

Students will be allowed to carry out research in a chosen area of Quantity Surveying/ Construction Management under the

supervision of an academic staff. The result of the researchable topic should be creative and should be able to proffer solutions to practical problems in the construction industry.

B. MASTER OF TECHNOLOGY (M. TECH) PROGRAMMES

QSV 801 Measurement and Costing of Construction Work 3 Units

General overview of systems of measurement and description, with a view to suggest improvements. Measurement of more complex foundation and underpinning. Measurement of complex steel works- Roof structure, frames etc. Measurement of air field construction, large sewer and drainage sewage treatment installations, power station, pump houses, dam and water and gas pipelines. Measurement of pipework, appliances, fittings and builder's work for heating, ventilation, air-conditioning systems, Fire fighting and hydraulic installations, compressed air and gas installations. Heavy and process engineering measurement- petrochemical, manufacturing processes and plant etc.

QSV 802 Construction Estimating and Logistics 3 Units

Analytical estimating and application of work study programmes (this will involve practical studies aimed at improving the standard labour output used for estimating). Tendering and bidding theory, material cost control, variances, cost coding and game theory.

QSV 803 Advanced Cost Control 3 Units

Investigation of the briefing process and early design and cost advice for construction projects. Application of construction psychology to the briefing process. Feasibility studies. Critical study of contemporary evaluation techniques such as D.C.F., cost-benefit analysis, sensitivity analysis etc. Modern cost modelling techniques and application of computer. Improved cost planning techniques as a more valuable contribution to building design and construction process, Life cycle of Buildings.

QSV 804 Applied Contract Law and Administration 3 Units

A detailed and comparative knowledge of the standard forms of Building and Civil Engineering contracts and related sub-contracts including their interpretation and application in Nigeria. Examination of typical contract documents in relation to key stages in project development. Case studies, cited and decided cases including analysis, interpretation and justifications. Contract conditions for emerging contract procurement methods such as design and build, project management etc. Legal aspect relevant to building maintenance.

QSV 805 Applied Research Methods 3 Units

Research in the Built Environment. Choosing a Research Topic-Availability of information, matching student and faculty interests, Special considerations. Research process- Finding a good problem, Designing the study, Sampling design, Resource allocation and Budgets, The proposal, Pilot testing, Data collection, Analysis and interpretation, Reporting research. The Research Proposal- The purpose, The contents. The Design of Research-Design strategies, Sampling Design, Measurement, Measurement scales. The Sources and Collection of Data- Secondary sources, Survey methods, Instruments for respondent communication, Observational studies, Experimentation, Analysis and Presentation of Data- Data preparation and description, Exploring, displaying and examining data, Hypothesis testing, Measures of Association, Multivariate analysis. Thesis Writing and Presentation in FUTA- The structure of a thesis, Writing styles, Thesis presentation, Criteria for judging thesis.

QSV 806 Project Risk Management 3 Units

General theories of risk and decision making. The nature of decision and the criteria upon which decisions are made. The nature of risk; including the relationship between risk and uncertainty, reward, value and premiums together with calculation. Approach to risk identification, evaluation, assessment, allocation & management. Approaches to decision making. Project procurement, funding and contractual division of project risk. Tools & techniques for decision-making and risk analysis.

QSV 807 Value Management 3 Units

An overview & background of value management, value management & value engineering. Global developments, Approaches to value management, Evaluation of importance of value to client, assessment of value criteria for specific projects- process of client briefing and qualify modeling, Techniques in use in the identification of function & prioritizing of requirements. Functional Analysis, Teams, team dynamics & facilitation, Toolbox, Case studies of previous projects. Practical application of value engineering to live projects.

QSV 808 Operations Research Application 3 Units

Problems solving case studies of complex construction activities using linear programming- Simplex methods, Transportation problem. Inventory Queuing theory and other quantitative methods. Simulation. Computer applications with specific reference to the construction industry. A critique of their uses and possible suggestions.

QSV 809 Project Psychology 3 Units

Evaluation of the interaction of people in the project environment, Nature of effective team work & the importance of appropriate leadership, project Environment vis-à-vis communication, behaviour and dealing with the inevitable conflict. Industrial psychology as a science measurement of Intelligence, perception, Personality, arousal etc.

Development of skills. Occupational choices, motivation and job satisfaction. Recruitment and selection techniques. Case studies.

QSV 811 Strategic Construction Procurement**3 Units**

Exploration of professional services procurement by client within the construction industry. History nature of the industry. Examination of the new procurement approaches being implemented within the construction industry, importance of working in partnership across organisations, professions and with the communities. Experience, potential & problems of inter – agency working in the public & private sectors. Empirical & theoretical knowledge of current issues of collaborative working. Analysis & evaluation of examples of collaborative working practice. Ethics and corporate social responsibility. Future issues in construction procurement.

QSV 820 Advanced Project Management**3****Units**

An overview of contract procurement systems and the integration of project management. Definition and approach to construction project management. Conflict of professional roles and the integration of project management. Environmental effects and project characteristics. Structure of clients and professional organization. Dispute and conflict resolution, leadership, team building & project closure, power and the project manager, Decision making and the project manager. Crashing in project planning.

QSV 822 Financial Management in Construction**3****Units**

Importance of financial management to project management. Evaluation of the significance of financial matters in decision making by all participants in the project process, process of financial reports, analysis. Financial strategies and instruments for ensuring the solvency & sustainability of corporate business ventures. Methods of raising capital & the issue in portfolio management in the light of risk and rewards associated with investment initiatives. Project financing options (private finance & joint venture initiatives). Company financial Structure- Depreciation, Budgeting, cash flow, Lock-up, working capital, costs and break-even Analysis. Cost control, variance analysis. Time Value of money. Capital investment appraisal. Servicing and repayment of loans, methods of Loan renegotiation and rescheduling.

QSV 823 Management of Design & Construction 3 Units

Management and control of construction project by contractors and management of design projects by designers, engineers, architect and Quantity Surveyor. The theory and practice of design and construction of buildings. Design methods and Process, production methods and processes in the building sites. Influence of large unskilled labour and construction plant on design and construction

methodologies. Innovative value judgement of design and construction team within the construction industry. Practical examples of application of both contractors and design offices.

QSV 824 Project Performance Management

3 Units

Introduction to construction productivity analysis and performance management. Life cycle of performance measurement system. Balance score card. Key Performance Indicators. Factors affecting construction productivity. On-site factors-job conditions, preplanning management coordination, human factors, equipment utilization, material handling, site organization, work environment (temperature, humidity and wind). Offsite factors- government regulation, financial status organization and contractual constraints, suppliers etc. Direct productivity measurement; production units/ inputs unit. Indirect productivity measurement-work sampling five-minute rating, time-motion study etc. Construction productivity improvement- constructability study, selection of designer contractor, and construction measurement firm etc. Benchmarking- history & principles of benchmarking.

QSV825 International Management Issues in Construction

3 Units

History of modern contracting current situation & future trends. The role of culture in construction management. International construction markets and emerging trends. Managing construction in international settings. International Joint Ventures, Technology transfer, Partnering and strategic alliance. Quality management in construction international standards, -180 140000- safety standards. Private finance of public infrastructure. The nature of international market. The major parties (from) actually improved in international construction; international contracts & bidding strategies. The financial aspect of international construction & international agencies. Case studies in emerging issues for construction management in specific countries.

QSV 826 Human Resources Management

3 Units

Integration of the needs of organisation and those of the individual to maximize motivation & to develop leadership styles and workplace practices that are appropriate for managing projects & people. Analysis of the value of people set within organisational culture & management of change strategies & practices. Human resources considerations in the construction industry. Linking theoretical models of human behavior to practical personnel issues in construction.

QSV 827 Organizational Change

3 Units

Management of change & how this affects an organization's ability to identify, define and engage with the management & control of business development. Theoretical models of organisational change, responsiveness to competitive pressure & organizational audit.

QSV 828 Planning and Operation of Production System

3 Units

Objectives of production systems, constraints, Conflicts and external influences. Formulating Site policy and procedure. Site organizational structures .Project planning prior to and during construction stage and short term planning and scheduling technique. Production control- techniques, information control and feedback, use of decision rules.Quality control procedures on the site. Supervision-staff and labour organization, industrial relationships, site meetings procedures, site records. Plant and materials management and information flow. Materials management (onsite and offsite).Importance of construction control of construction plant and equipment with emphasis on site applications. Acquisition, maintenance, organization and financial management of construction plant by contractors plant divisions and plant hire companies. Influence to tax on buying of new equipment.

QSV 899 Master's Thesis Research Project

1 2

Units

This should consist of an independent work with sound theoretical and investigative approach in a chosen area of Quantity Surveying/ Construction management leading to an original contribution to knowledge.

C. DOCTOR OF PHILOSOPHY

QSV 999 PhD Thesis Research Project

Original research project, which must involve independent investigations into any research focus in Quantity Surveying/ Construction Management. The product of the research must form a definite contribution to knowledge. Every candidate must present at least two successful seminars before the submission of Ph.D thesis for examination. The thesis format must be in accordance with FUTA standard.

ACADEMIC STAFF LIST

S/N	Name	Qualification	Status	Area of Specialization
1.	Dr. O.A. Awodele	B. Tech, M.Tech, (QS) Ph.D (Construction Project Management) MNIQS, RQS, MAPM	Senior Lecturer	Project Management, Measurement, Contract Admin, Procurement Studies, Risk Management and Safety Mgt.
2.	Prof. D. R. Ogunsemi	B.Sc. (Bldg), M.Sc., Ph.D(QS), MNIQS, MNIOB, RQS. R. Bldr	Professor	Cost Management, Procurement Studies, Housing Studies & Project Management
3.	Dr. I.O. Aje	B.Tech, M.Tech, Ph.D (QS)	Professor	Construction Contract Procurement & Administration. Cost Management, Measurement of Construction Works.
4.	Dr. Abiola-Falemu	B.Sc (Bldg) M.Sc., PhD (Construction Management)	Senior Lecturer	Construction Management, Performance Improvement in Construction organizations, Employees Commitment.
5.	Dr. O. T. Ibironke	B.Sc.(QS), M.Sc. (Construction Management) MNIQS, RQS, MIC Arb.	Lecturer I	Construction Economics, Construction Management, Contract Law & Arbitration, Performance Measurement, Professional Practice
6.	Dr. N. Saka	B. Tech (QS), M.Tech (Construction Management) AMNIM	Lecturer I	Construction Economics, Construction Management, Risk Management
7.	Dr. P.O. Akanni	B.Sc. (Bldg),PGD (QS) M.Sc. (Engineering. Management), MNIOB,	Lecturer I	Construction Management and Construction Tech.
8.	Dr. F. O. Akinradewo	HND (QS), PGD (QS), M.Sc. Construction Management MNIQS, RQS, MCI Arb.	Lecturer I	Construction Management, Measurement, Professional Practice & Construction Claims Management
9.	Dr. J. A. Akinola	B.Tech (QS); M.Sc. (Construction Management) MBA; MNIQS, RQS.	Lecturer I	Optimization of Construction, Resources; Procurement Studies
10.	Dr. S. O. Olatunji	HND, PGD (QS), M.Sc. (Construction Management) MNIQS, RQS, MCI Arb.	Lecturer II	Contract Procurement and Professional Practice
11.	Dr. O. Alake	B. Eng (Civil), M.Sc (Building Structures)	Lecturer II	Building Structures, Construction Management
12.	Dr. T. O. Oladinnrin	B.Tech, M.Tech, Ph.D	Assistant Lecturer	Construction Economics, Measurement and Construction Project Management
13	Dr. E. O. E. Nnadi	B.Tech, M.Tech (QS)	Lecturer I	

9.3.5 DEPARTMENT OF SURVEYING AND GEOINFORMATICS (SVG)

AVAILABLE OPTIONS/SPECIALIZATIONS

- (a) **Postgraduate Diploma (PGD) in Surveying and Geoinformatics**
- (b) **Master of Technology (M.Tech) in Surveying and Geoinformatics with specializations in:**
 - (i) Geodesy
 - (ii) Photogrammetry
 - (iii) Remote Sensing
 - (iv) Hydrography
 - (v) Geoinformatics
- (c) **Doctor of Philosophy (Ph.D) in Surveying and Geoinformatics with specializations in:**
 - (i) Geodesy
 - (ii) Photogrammetry
 - (iii) Remote Sensing
 - (iv) Hydrography
 - (v) Geoinformatics

PHILOSOPHY AND OBJECTIVES

(i) Post Graduate Diploma (PGD) Programme

The philosophy of this programme is to create an enabling environment of interaction between those candidates who have acquired technological experience with limited academic exposure and those graduates in Surveying and Geoinformatics who may not have gone through the rigors of practical experience. This will produce a blend of Surveyors who will function effectively in the areas of Surveying and Geoinformatics. Specific objectives are to:

- (a) bridge the gap between the Higher National Diploma and First degree in Surveying and Geoinformatics in order to allow the former pursue higher degree programmes and also qualify them for registration with Surveying and Geoinformatics professional bodies;
- (b) train those who may wish to make up their deficiencies in first degree to qualify them for admission into Masters Degree programme in Surveying and Geoinformatics; and
- (c) produce qualified professional, project analysts and project developers in the broad areas of Surveying and Geoinformatics.

(ii) Master of Technology (M.Tech.) Programme

The philosophy of the M. Tech. programme is specifically directed towards providing graduates with the opportunity for further studies and research in the specialized areas of Surveying and Geoinformatics.

Specific objectives are to:

- (a) provide an advanced knowledge for the holders of Postgraduate Diploma (PGD) and Bachelor of Technology/Science Degree in Surveying and Geoinformatics which qualifies them for admission into Ph.D Degree in Surveying and Geoinformatics; and

(b) produce qualified surveyors, research/project analysts and project developers in the broad areas of surveying and geoinformatics.

(iii) Doctor of Philosophy (Ph.D)

The philosophy of the Ph.D programme is specifically directed towards providing qualified candidates with the opportunity for further studies and research in the specialized areas of Surveying and Geoinformatics.

Specific objectives are to:

- (a) provide advanced knowledge and skills for the holders of Master of Technology (M.Tech.) Degree in Surveying and Geoinformatics; and
- (b) produce qualified researchers, research project analysts and project developers in the specialized areas of Surveying and Geoinformatics.

ADMISSION REQUIREMENTS

(a) Post Graduate Diploma Programme

Candidates for admission to the programme should possess any of the following qualifications:

- (i) B.Tech./B.Sc. in Surveying and Geoinformatics with at least Third Class Honours Division of The Federal University of Technology, Akure or any other recognized University.
- (ii) B.Tech./B.Sc. in Mathematics, Physics, Geography, Quantity Surveying, Building Technology, Architecture, Estate Management, Urban and Regional Planning, Remote Sensing and Geoinformation Sciences, Engineering and Computer Sciences with minimum of Second Class Honours (Lower Division) of The Federal University of Technology, Akure or any other recognized University.
- (iii) Higher National Diploma in Surveying and Geoinformatics with minimum of Lower Credit from the NBTE accredited programme of Monotechnics, Polytechnics and Colleges of Technology.

(b) Master of Technology (M. Tech.)

Candidates seeking admission to the programme must possess any of the following qualifications:

- (i) B.Tech./B.Sc. Degree in Surveying and Geoinformatics with a minimum of Second Class Honours (Lower Division) of The Federal Universitof Technology, Akure or any other recognized University.
- (ii) Postgraduate Diploma (PGD) in Surveying and Geoinformatics with a minimum of Upper Credit of Federal University of Technology, Akure or any other recognized University.

(b) Doctor of Philosophy (Ph.D)

Candidates seeking admission to the programme must possess M.Tech./M.Sc. Degree and attain a weighted

average of at least 60% or minimum CGPA of 3.5 on a 5.0 point grade in the relevant area of Surveying and Geoinformatics of The Federal University of Technology, Akure or any other recognized University.

DURATION OF PROGRAMMES

(a) Post Graduate Diploma (PGD) Programme

The programme will be for minimum of 18 months and on full-time basis.

(b) Master of Technology (M. Tech.) Programme

The programme will be for a minimum of eighteen months (18) and maximum of 24 months on full time basis.

(c) Doctor of Philosophy (Ph.D) Programme

The programme runs for minimum of thirty six months (36) on full time basis while it will be for a minimum of forty eight (48) on part-time basis.

GRADUATION REQUIREMENTS

(a) Post Graduate Diploma (PGD) Programme

Candidates must pass a total of 38 units. This is made up of 32 units of course work and 6 units of research project.

(b) Master of Technology (M.Tech.) Programme

Candidate must pass a total of 36 units. This is made up of 24 units of course work and 12 units of research work. Also, candidate is expected to present 2 seminars and pass oral examination based on his/her research work before panel of examiners.

(c) Doctor of Philosophy (Ph.D) Programme

Candidate is expected to present 3 seminars and pass an oral examination based on his/her thesis before panel of examiners.

COURSE OUTLINE FOR THE PROGRAMMES

Post Graduate Diploma (PGD) Programme

First Semester

Course Code	Course Title	L	T	P	U
SVG 701	Applied Survey Computation I	2	1	0	3
SVG 703	Geodesy I	2	0	0	2
SVG 705	Photogrammetry I	2	0	0	2
SVG 707	Remote sensing Applications I	1	0	3	2
SVG 709	Geoinformatics I	1	0	3	2
SVG 711	Hydrography I	1	0	3	2
SVG 713	Geophysical Surveying	1	0	3	2
Total					15

Second Semester

Course Code	Course Title	L	T	P	U
SVG 702	Applied Survey Computation II	2	0	1	3
SVG 704	Geodesy II	1	0	3	2
SVG 706	Photogrammetry II	1	0	3	2
SVG 708	Remote sensing Applications II	1	0	3	2
SVG 710	Geoinformatics II	1	0	3	2
SVG 712	Hydrography II	1	0	3	2
SVG 714	Seminar on Geospatial Issues	1	0	3	2
Total					15

Third Semester

Course Code	Course Title	L	T	P	U
SVG 715	Computer Applications	2	0	0	2
SVG 799	Research Project	0	0	1	6
Total					8

(a) **Master of Technology (M. Tech.) Programme**

First Semester

Course Code	Course Title	L	T	P	U
SVG 801	Data Acquisition Systems I	2	1	0	3
SVG 803	Applied Mathematical Methods	2	1	3	3
SVG 805	Spatial Statistics	2	1	0	3
SVG 807	Research Methodology	2	1	0	3
	Elective	2	1	0	3
Total					15

Elective Courses

Course Code	Course Title	L	T	P	U
SVG 809	Advanced Geometric Geodesy	2	1	0	3
SVG 811	Advanced Hydrographic Surveying I	1	1	3	3
SVG 813	Advanced Remote Sensing I	1	1	3	3
SVG 815	Advanced Photogrammetry I	1	1	3	3
SVG 817	Advanced Concepts in Geoinformatics	2	1	0	3

Second Semester

Course Code	Course Title	L	T	P	U
SVG 802	Data Acquisition Systems II	1	1	3	3
SVG 804	Advanced Data Structure	2	1	0	3
	Elective Course	2	1	0	3
	Total			9	

Elective Courses

Course Code	Course Title	L	T	P	U
SVG 806	Advanced Physical Geodesy	2	1	0	3
SVG 808	GIS Implementation Strategies	2	1	0	3
SVG 812	Advanced Hydrographic Surveying II	1	1	3	3
SVG 814	Advanced Remote Sensing II	1	1	3	3
SVG 816	Advanced Photogrammetry II	1	1	3	3

Third Semester

Course Code	Course Title	L	T	P	U
SVG 899	Research Project	0	0	36	12

(a) Doctor of Philosophy (Ph.D) Programme

Course Code	Course Title	L	T	P	U
SVG 999	Ph. D Research Project				

COURSE SYNOPSIS

(a) POST GRADUATE DIPLOMA (PGD) PROGRAMME

SVG 701 APPLIED SURVEY COMPUTATION I (3 UNITS)

Theory of errors, Linear and non linear least squares estimation. Matrices, diagonalization. Least squares adjustment techniques: condition equations, observation equations, combined model, weight and functional constraints. Solution of normal equations, addition of observation and parameters, removal of observations. Treatment of large geodetic networks.

SVG 702 APPLIED SURVEY COMPUTATION II (3 UNITS)

Quality control: Statistical analysis, error ellipse, internal and external reliability of survey network. Correlation and regression. Classification and analysis of interdependence. Prediction: Interpolation, extrapolation. Analysis of spatial pattern. Representation of spatial distribution, Surface trend modeling.

SVG 703 GEODESY I (2 UNITS)

Geometry of an ellipse, Geodetic, geocentric and reduced latitudes. Computation of latitude differences. Space rectangular coordinates. Radii of curvature and Gaussian mean radius. Lengths and areas on the ellipsoid. Radii of spherical approximations to the ellipsoid. Curves on the ellipsoid: normal section and geodesic. Arc lengths of normal sections. Separation between reciprocal normal sections. Special properties of geodesic. Direct and inverse problems on the sphere and ellipsoid. Geodetic datum and use of ellipsoid as a reference surface. Transformation of coordinates from one datum to another.

SVG 704 GEODESY II (2 UNITS)

The earth and its gravity field, potentials, geoidal undulation and deflection of vertical. Geopotential numbers, height systems: orthometric, dynamic and normal height systems. The earth, its size and shape: actual shape; approximations (geoid and other figures of the earth). Gravity observations: absolute and relative. Gravity reduction and gravity anomalies. Basic concept of satellite geodesy, Positioning methods: dynamic and geometric observations. TRANSIT and NAVSTAR GPS systems. Integration of satellite data with other geodetic network data.

SVG 705 PHOTOGRAMMETRY I (2 UNITS)

Definition and general introduction. Photographic principles and optical characteristics. Properties of aerial photograph. Elementary mapping from photographs e. g. radial line and slotted template methods of producing planimetric maps. Principles and use of cameras, sketchmaster, stereoplotters and comparators. Preparation of photomosaics. Preparation of thematic maps.

SVG 706 PHOTOGRAMMETRY II (2 UNITS)

Procedures and mapping by photogrammetric methods: Analogue, analytical and digital photogrammetric methods. Project planning/costing of photogrammetric projects. Proposal writing (with specification) of photogrammetric projects. Application of photogrammetry to engineering problems. Photogrammetry and GIS.

SVG 707 REMOTE SENSING APPLICATIONS I (2 UNITS)

General theory of non-contact mapping methods and their

advantages. Electromagnetic radiation and interaction with matter. E-M spectrum especially the optical wave/lengths. Types and design of electromagnetic sensors. The photographic camera, Radiometers, thermal scanners and multispectral scanners. Sensor platforms. Introduction to digital processing. Elements of photo-interpretation.

SVG 708 REMOTE SENSING APPLICATIONS II (2 UNITS)

Sensor platforms. Geometry of artificial satellite orbits. GPS positioning, Fundamentals of pattern recognition, functions. Pattern classifier concepts. Digital image processing. Pre-processing of RS data, image enhancement techniques, image transforms. Filtering. Classification techniques.

SVG 709 GEOINFORMATICS I (2 UNITS)

Definition and basic concept of GIS. Elementary of mathematical concepts of graph theory, set theory and topology. Components of GIS. Field-based and object based concepts of real world. Spatial data models: 2D, 3D and 4D models. Tessellation data model, vector data models, tessellation versus vector spatial relationships: metric, topologic and spatial order. Data quality, positional accuracy, attribute accuracy, logical consistency. Semantic data modeling,, database structures: relational, network and hierarchic. Object oriented data modeling. Object-relational data structure. Applications: topographic, cadastral, utility and environmental database. Computer graphics: Digital representation of graphic objects: Point, line and polygon elements. Digital representation of cartographic symbols and name placement. Data structures.

SVG 710 GEOINFORMATICS II (2 UNITS)

GIS subsystems: data collection and input, data storage and retrieval data manipulation and analysis, visualization and reporting. Structured query language (SQL). Database management system (DBMS): types and functions, review of some existing GIS software. Database design steps and implementation. Specific study of a topic under one of the following areas (each student is required to submit a term paper on the chosen topic):

(a) Topographic information system, (b) Cadastral information system, (c) Environmental information system Raster and vector graphics, Hardware and software graphic systems. Coordinate transformation for orthogonal and perspective projections. Data structure for computer graphics; 2D and 3D graphics, map analysis.

SVG 711 HYDROGRAPHY I (2 UNITS)

Introduction to hydrography, coastal processes- waves, tides, tidal streams, currents including longshore, river and tidal density, chart and sounding datums. Determination of sea level and mean sea level, tide poles and tide gauges. Two-dimensional positioning at sea, bathymetry, positioning accuracies. Measurement systems, optical and electronic methods, sources of errors. Introduction to satellite navigation

and positioning.

SVG 712 HYDROGRAPHY II (2 UNITS)

Sounding, wave propagation, Matthew's charts, vertical beam, echo sounder instrumentation, operation, calibration. Acoustic waves. Ports development and port management, Sweeping, side looking sonar, multibeam sonar, electronic sweeping. Element of oceanography, tides, currents, temperature, salinity, dredging and channelisation pressure measurement sedimentation, beach erosion. Modern techniques in hydrography.

SVG 713 GEOPHYSICAL SURVEYING (2 UNITS)

Introduction to geophysical surveying; Geophysical surveying methods (i.e. Gravimetric, Magnetic, Electrical, and Seismic methods) and matching methods to applications; planning geophysical survey and geophysical survey design. Gravimetric method: Gravity measurement, gravity reduction (Bouguer, Free Air, Terrain, Local Latitude, Isostatic, etc corrections), reduced gravity, normal gravity, gravity anomaly, regional gravity anomalies and residual gravity anomalies, applications in geophysical exploration.

SVG 714 SEMINAR ON GEOSPATIAL ISSUES (2 UNITS)

Instructions on the preparation, discussion and presentation of critical review of topics on important geospatial problems. Introduction to research technique on important topics bordering on Geospatial problems. Student's research on topical issues in Geospatial data handling. This should be prepared and orally defended. Also, it includes written presentation of reports.

SVG 715 COMPUTER APPLICATIONS (2 UNITS)

Computer programming: Flowchart, Algorithms, Visual Basic, Visual Fortran, Development of simple programs and routines for basic surveying operations – Traversing, Leveling, Triangulation, Photogrammetry, Hydrography, etc. Development and applications of software for least squares solution surveying and geoinformatics problems such as coordinates computations, areas and volumes of earth works, production of map series.

SVG 799 RESEARCH PROJECT 6 UNITS)

Proposal of the project, which includes introduction, definition of problem(s), statements of objectives, working hypothesis and methodology must be defended and approved by the departmental board of examiners.

(a) MASTER OF TECHNOLOGY (M. TECH.) PROGRAMME

SVG 801 DATA ACQUISITION SYSTEMS I (3 UNITS)

Definitions: Electromagnetic radiation, transmission absorption and reflections; types of sensing devices and

platforms, Digital techniques for enhancement, transformation, filtering, classification of geometric corrections, masking and feature extraction. Integration with other data sources. Applications in Environmental and physical sciences. Implementation details and exercises, Introduction to aerial photographs, Analytical treatment of photographic measurements, Introduction to digital photogrammetry, principles of photogrammetric mapping.

SVG 802 DATA ACQUISITION SYSTEMS II (3 UNITS)

Basic concepts of positioning, positioning on dynamic surface, control establishment, electroning surveying, GPS position determination: Static, DGPS, kinematic, pseudo-kinematic, rapid-static, on-the-fly. Real-time kinematic RTK. Planning a GPS survey: single difference, double difference, triple difference, post-processing of GPS data. GPS software. Basics of topographic mapping, map projection.

SVG 803 APPLIED MATHEMATICAL METHODS (3 UNITS)

Review of matrix algebra; solution of systems of linear equations; direct and indirect methods. Least square models: parametric method, method of correlates and mixed models. Weight and functional constraints. Treatment of large geodetic networks and special network. Univariate Statistics: Statistical distribution, Interval estimations and hypothesis testing.

SVG 804 ADVANCED DATA STRUCTURES (3 UNITS)

Data modeling: definition, purpose, components, methodology, raster and vector data models. Raster and quad tree data structures. Spatial relationships, emergence of database technology, different views of data base, architect. Database designs: relational, network, hierarchical and binary relationship models. Database query and manipulation. Distributed databases. Arc-node topology using database linking spatial and attribute information. Map productions. GIS functionality: point- and line-in-polygon, buffering, overlays. Implementation details and exercises using PC Arc/Info and Oracle.

SVG 805 SPATIAL STATISTICS (3 UNITS)

Advanced statistical analysis and graphics. Surface modeling. The methods of least squares and error analysis. Basic concepts of system modeling. Contouring, interpolation methods, kriging and co-kriging. Visualization methods and imaging. Applications in environmental science. Spatial phenomena and spatial processes, spatial data analysis. Variogram, semi-variogram. Estimation and modeling of non-stationary covariances.

SVG 806 ADVANCED PHYSICAL GEODESY (3 UNITS)

The earth's external gravity field and the figure of the earth. The boundary value problem of physical geodesy. The problem of the geoid, regularized and actual geoid. Reduction to the geoid. Direct determination of the physical surface of the earth. Astrogeodetic, gravimetric and astrogravimetric methods of geoid determination. Methods of satellite geodesy.

Gravity field estimation: Least squares and least squares collocation approaches.

SVG 807 RESEARCH METHODOLOGY (3 UNITS)

The aim is for developing a good post graduate research proposal. Importance will be attached to the identification of research problem(s), literature review, significance of the research, acquisition of data, quality of data, processing of data which include development/derivation of relevant mathematical models (if any) and numerical investigations of the solutions to problems, descriptive and inferential statistical analysis of the results, research contributions to knowledge, conclusions and recommendations.

SVG 808 GIS IMPLEMENTATION STRATEGIES

(3 UNITS)

User needs definition and GIS product requirements, requirement analysis and feasibility evaluation, developing a workable solution and implementation plan, system implementation, system design, database design, system installation, training and support, system testing, documentation.

SVG 809 ADVANCED GEOMETRIC GEODESY (3 UNITS)

Review of the properties of the ellipsoid. Curves on the surface of the ellipsoid. Solution of the direct and indirect problems on the ellipsoid. Astrogeodetic deflections of the vertical and the laplace equation. Reduction of observations to the ellipsoid. Observation equations for triangulation, trilateration and traverse computations on the ellipsoid. Best fitting and general terrestrial ellipsoids. Datum definition and determination. Datum transformation. Geometric methods of satellite geodesy

SVG 811 ADVANCED HYDROGRAPHIC SURVEYING I (3 UNITS)

Tide and tidal currents, their measurement and interpretation. Principle of harmonic analysis and prediction of tides. Tidal datum planes, Graphical analysis. Characteristics of tides in bays, current meters, and amphidromic systems. Oceanographic sounding and positioning a float. Hydrographic measurements, Automation and programming, data analysis. Law of the sea. Revision of geodetic principle for control establishment, vertical control observations and computations necessary to establish tidal datum. Shore line mapping by ground survey and photogrammetric methods. Appreciation of the limitations of nautical chart.

SVG 812 ADVANCED HYDROGRAPHIC SURVEYING II (3 UNITS)

Surveying management and project planning, including tendering and contracting procedures, element of sedimentary processes. Quality control and analysis of

positioning methods, control for dredging and reclamation, conservancy law reports, visual and radar navigation systems, sand mining and required regulations. Analysis, Planning and execution of projects. Dynamic oceanography, coastal oceanography, air ocean fluid dynamics. Quality control in bathymetry.

SVG 813 ADVANCED REMOTE SENSING I (3 UNITS)

Electromagnetic energy, electromagnetic spectrum, remote sensors, aircraft and space craft remote sensing systems. Landsat satellite system data. Atmospheric errors in remotely sensed data. Reflection, Spectral characteristics of objects:

Vegetation, soil, water. Analysis of data: qualitative and quantitative analysis.

SVG 814 ADVANCED REMOTE SENSING II (3 UNITS)

Statistical properties of digital data. Pattern recognition. Digital image classification: supervised and unsupervised methods. Mathematical algorithms for image classification, cluster analysis, maximum likelihood, separating hyperplanes. Cartographic accuracy of digital satellite imagery. Comparison of Landsat and spot satellite digital image rectification. Computer supported production of thematic maps. Error correction of image data. Correction of radiometric and geometric distortions. Radiometric and geometric enhancement techniques.

SVG 815 ADVANCED PHOTGRAMMETRY I (3 UNITS)

Concepts of collinearity and coplanarity, Collinearity equations. Correction of Systematic Errors, Analytical Relative Orientation. Analytical approach to independent models, weight constraints in Photogrammetry, Bundle Adjustment, Self-calibrating Adjustment system. Least squares methods in the adjustment of large Aero-triangulation blocks; first and second order partitioned regression (course is strictly computer oriented).

SVG 816 ADVANCED PHOTGRAMMETRY II (3 UNITS)

Scanners, digital cameras, features extraction, automated digital terrain modeling (DTM), digital aerotriangulation, digital orthophoto, digital photo workstation and digital photogrammetry applications including: image scanning and digital cameras, orientation of digital photogrammetric images, digital terrain model, digital orthophoto, plotting in mono and stereo, digital photogrammetric workstation. Mapping from space (modeling the perspective geometry of line cameras), Multi-sensor aerial triangulation (integrating aerial and satellite images with Navigation data).

SVG 817 ADVANCED CONCEPTS IN GEOINFORMATICS (3 UNITS)

Relational Data Base Design: Normalization and implementation; Object – oriented Database Design and implementation; Building of Topographic Information System: Topographic database, data requirements, design steps and

implementation. Data modeling: definition, purpose, components, methodology, Multi Criteria Evaluation (MCE), Multi Objective Land Allocation (MOLA), Markov Chain. Database design: relational, network, hierarchical and binary relationship models. Database query and manipulation. Distributed databases. Arc-node topology, using a database linking spatial and attribute information. Map production. Point and Line-in polygon, buffering, overlays. Implementation details and exercises using Arc/info, TNT MIPS, and Idrisi etc. Computer programming in GIS: Visual basic, any other object-oriented programming language, source codes for GIS basic functions, customized GIS programs.

SVG 899 RESEARCH PROJECT (12 UNITS)

Each candidate will be assigned a supervisor who will assist him/her in the choice of a research topic. Candidates, who are expected to work independently, should always seek their supervisors' guidance throughout the research. Each candidate is expected to defend his/her proposals, which include introduction, problem definition, literature review and methodology, before a panel of internal examiners.

DOCTOR OF PHILOSOPHY (PH.D) PROGRAMME

SVG 999 Ph. D RESEARCH PROJECT

Original research project which must involve independent investigations into any research focus in Surveying and Geoinformatics. The product of the research must form a definite contributions to knowledge. Every candidate must present at least three successful seminars before the submission of Ph.D thesis for oral examination.

ACADEMIC STAFF LIST

S/N	NAME	QUALIFICATIONS	STATUS	SPECIALIZATION
1.	T. O. Idowu	B.Sc., M.Sc., Ph.D (Lagos)	Professor	Geodesy and Gravity Exploration
2.	J. O. Akinyede	B.Sc., M.Sc., Ph.D (Canada)	Professor	Space Geodesy
3.	M. A. Oyinloye	B.Sc., M.Sc., Ph.D (Akure)	Reader	Planning and GIS
4.	A. E. Olajuyigbe	B.Sc., M.Sc., Ph.D (Akure)	Reader	Urban Survey
5.	G. E. Ajayi	B.Sc., M.Sc., Ph.D (Hanover)	Lecturer I	Photogrammetry
6.	M. O. Ibitoye	B.Sc., M.Sc., Ph.D (Akure)	Lecturer I	Remote Sensing
7.	V. A. Ijaware	B.Sc., M.Sc. (Lagos)	Lecturer I	Geoinformatics
8.	S. O. Babalola	B.Sc., M.Sc. (Yola)	Lecturer II	Geoinformatics
9.	T. Herbert	B.Sc., M.Sc. (Yola)	Lecturer II	Geodesy
10.	T. O. Ariyo	B.Sc., M.Sc. (Lagos)	Lecturer II	Hydrography
11.	J. B. Olaleye	B.Sc., M.Sc., Ph.D, (NewBrunswick)	Adjunct Professor	Photogrammetry/ Remote Sensing
12.	O. Kufoniyi	B.Sc., M.Sc., Ph.D (Nertherland),	Adjunct Professor	Photogrammetry/ Remote sensing
13.	O. T. Badejo	B.Sc., M.Sc., Ph.D (Lagos)	Adjunct Senior Lecturer	Hydrography
14.	J. O. Olusina	B.Sc., M.Sc., Ph.D (Lagos)	Adjunct Senior Lecturer	Geoinformatics

9.3.6 DEPARTMENT OF URBAN AND REGIONAL PLANNING (URP)

1. PROGRAMMES OFFERED.

- a. Postgraduate Diploma in Urban and Regional Planning
- b. Master of Technology in Urban and Regional Planning
- c. Doctor of Philosophy (Ph.D) in Urban and Regional Planning

2. AVAILABLE OPTIONS IN URBAN AND REGIONAL PLANNING AREA OF SPECIALIZATIONS.

- a. Postgraduate Diploma in Urban and Regional Planning
- b. Master of Technology in Urban and Regional Planning
- c. Doctor of Philosophy (Ph.D) in Urban and Regional Planning

A. POSTGRADUATE DIPLOMA (PGD) PROGRAMMES

1.0 PHILOSOPHY AND OBJECTIVES.

The post graduate diploma in (PGD in Urban and Regional Planning offer an educational opportunity designed to meet the specific needs of those who want to move up the profession. It is specifically designed for those who have successfully completed their Higher National Diploma (HND) in a Polytechnic or college of Technology but could not proceed to University for a Master degree on account of the terminal nature of the HND. Successful candidates of this PGD programme can register for the master's degree Programme or work in our variety of planning agencies.

The Postgraduate Diploma in Urban and Regional Planning is designed to meet the following specific objectives:

- i. To provide a pool of professional manpower imbued with a deep understanding of the art and science of physical planning so as to reduce the Manpower shortage experienced at various levels of government and private planning agencies.
- ii. To give opportunity to HND students aspiring for the postgraduate degree in Urban and Regional Planning in recognized universities. The programme will qualify them for further studies in Masters Degree programme.
- iii. To provide opportunity to work in the variety of planning agencies and subsequent lateral crossing into the professional cadre.
- iv. To produce a crop of student who can meet the Registration requirement of our professional societies such as NITP and TOPREC.

2.0 ADMISSION REQUIREMENTS

Applicant for this programme should be:

- i. Holders of first degree in Environmental Studies, Social Sciences and Engineering, among others (with the exemption of holders of B.ED degree).
- ii. Holders of HND with a minimum of Upper Credit pass in Town Planning
- iii. Holders of HND with Lower Credit in Town Planning with a minimum of three (3) years of working experience in Planning related fields.
- iv. In addition, an applicant may be required as a condition of admission to undergo a selection process.

3.0 DURATION OF PROGRAMME

The academic programme is by course work with a supervised project. It runs for **FOUR SEMESTERS FULL TIME**. It is based on course unit system where the number of contact hour is paramount as the deciding factor.

4.0 REQUIREMENTS FOR GRADUATION.

Student shall be evaluated using examination and course work assessment. There shall be four semesters examinations plus continuous assessment. The semester's examination question shall cover all aspect of the syllabus contents for the course. In the case of studio design work, a mid-jury and final semester jury shall be conducted. Students are to defend their design their designed project for the terminal semester would be defended.

COURSE OUTLINE

First Year (1st Semesters) Core Courses

Course Code	Course Title	L	T	P	U
URP 701	Planning Theory	3	0	0	3
URP 703	Planning Studio (Neighbourhood Design)	3	0	0	3
URP 705	Advance planning principle & Techniques	3	0	0	3
URP 707	Transportation Planning	2	1	0	3
URP 709	Urban Economic	2	0	0	2
URP 711	Planning and computer Application	2	0	0	3
URP 713	Application of GIS to Urban and Regional Planning	2	0	3	3
	Total	17	1	9	19

Electives (options)

Course Code	Course Title	L	T	P	U
URP 715	History and evolution of Planning Thought.	2	0	0	2
URP 717	Population and Urbanization Studies	2	0	0	2
	Total	19	1	9	21

URP 727	Natural Resources Planning and Development	2	0	0	2
URP 729	Site Selection	3	0	0	3
URP731	Terminal Project (Dissertation)	3	0	0	3
	Total	3	0	6	17

First Year (2nd Semesters) Core Courses

Course Code	Course Title	L	T	P	U
URP 702	Quantitative Techniques	3	0	0	3
URP 704	Planning Studio II (Landscape Design)	3	0	6	3
URP 706	Planning Law and Administration	3	0	0	3
URP 708	Housing Process	2	0	0	2
URP 710	Environmental Engineering (Public Utilities)	3	0	0	3
URP 712	Coastal Management and Planning	2	0	3	3
	Total	16	0	9	17

Electives (options)

Course Code	Course Title	L	T	P	U
URP 714	Tourism Planning	2	0	3	3
URP 716	Urban Renewal	2	0	0	3
	Total	18	0	9/ 12	19/2 0

Second Years (1st Semesters) Core Courses

Course Code	Course Title	L	T	P	U
URP 721	Planning Studio (Regional Planning)	3	0	0	3
URP 723	Seminar on Contemporary	9	0	0	3
URP 725	Project Planning, evaluation and Financing	3	0	0	3

Electives (one option)

Course Code	Course Title	L	T	P	U
URP 733	Rural Development and Planning	2	0	0	2
URP 735	Settlement Planning	2	0	0	2
	Total	5	0	6	19

Second Year (2ND Semester) All Core

Course Code	Course Title	L	T	P	U
URP 722	Planning Practice	1	0	0	3
URP 724	Environmental planning and Management	3	0	0	3
URP 726	Research Techniques and Methodology	3	0	0	3
URP728	Regional Analysis	3	0	0	3
URP 730	Environmental Impact Analysis (EIA)	3	0	0	3
URP 732	Terminal Project	-	-	-	6
	Total	15	0	0	21

COURSE SYNOPSSES

URP 701: PLANNING THEORY

Theories and planning. Procedural and substantive planning theories; theories 'IN', theories OF and theories FOR planning. Detail study of rational comprehensive planning theory. Incremental planning, mixed scanning, Advocacy and Radicalist humanistic planning theory. System Approach to planning, Innovative planning, Corporate planning and strategic planning. The relationship of the planning theories to the preparation of Master plan, structure planned local plan. The concepts of need in planning. Citizen participation and evaluation in planning process. Social sciences contribution to the development of planning theory. Caring for the multi-cultural system. cities/regions in planning systems. Expectation versus

experience. General planning environment.

URP702: QUANTITATIVE TECHNIQUES

Simple Analytical Techniques for Analyzing Urban and Regional Planning Data. Descriptive Statistics and their relevance to Urban and Regional Planning. Forecasting Techniques. Inferential Statistics for Parametric and Non-Parametric Analysis. Regression Analysis. Quantitative Models in Urban and Regional Planning. Spatial Interaction Models

URP 703: PLANNING STUDIO I

Macro theories of design. The formulation of minimum and desirable space standards. Ecological approaches to urban and regional design. Visual elements in an urban and regional design. Visual element in an urban complex. Design resources, design composition, Space articulation and Aesthetic Qualities, Site planning and design for neighbourhoods - industrial, agricultural, commercial and recreational interaction land use. Practical assignment on site planning particularly the design of Housing, Industrial and Commercial Estates. Preparation of three-dimensional models.

URP 704: LANSACPE PLANNING

Values, forces and institution shaping Urban Form. Principles in Urban design. Organization of space. Elements within organized space Movement and Scale. Theoretical concepts and approaches to urban design realities in Nigeria towns and cities e.g. Functional distribution of mass and voids in relation to circulation and amenities., Study of manageability. Images of the city. Behavioural basis for design. The search for meaningful community form.

URP705:ADVANCED PLANNING PRINCIPLES AND TECHNIQUES

Analysis and seasonal variations. Aerial photography, methods of photo-interpretation and construction urban area maps and introduction to Remote Sensing. Rationalization and delineation techniques and their applicability to the Nigerian context. Techniques of understanding spatial structure. Analysis of Structure of formal regions e. g. Cluster and fact or analytical methods. Analysis of structure of nodes – hierarchy of structure of links and interactions, network analysis, information flows and spatial interaction. Strategic choice and Analysis of Interconnected Decision Areas (AIDA). Threshold analysis and its application. Evaluation Technique, Cost-Benefit Analysis, Project Planning Balance Sheet and Goal Achievement Matrix, etc

URP 706: PLANNING LAW AND ADMINISTRATION

Detailed studies of planning acts and Legislation in Nigeria. Land Laws, Public Health Code and the Housing code. Laws on compensation and compulsory acquisition with special reference to Nigeria. Local government reforms in Nigeria and effects on Urban Planning. Urban government systems, the

enforcement of development control, zoning and politics of planning in Nigeria. Appraisal of TOPREC Decree, FEPA Decree and Code of Conducts of the Nigerian Institute of Town Planners.

URP 707: TRANSPORTATION PLANNING

Land use and transportation planning, Traffic generation, distribution, modal split and assignment, methods of Traffic forecasting, origin and destination surveys. Design of road alignment, speed, sight distance, lanes and carriage ways, safety regulations and Transport network design standards. Mass transit in Urban centres. survey analysis and protection of mass transportation terminal facilities like railway stations. Preparation of a circulation plan/transportation plan as an integral part of the comprehensive urban development plan. Formulation and communication problems. Social infrastructures. EIA. Community Participation and other resources sustainability strategies, Existing Management agencies and policy. Policy adjustment and re-orientations.

URP 708: HOUSING PROCESS

Aims and objectives of housing policies and programmes in Nigeria. Priorities of urban and rural housing. Housing as a sector of investment and integral part of national plans in Nigeria. Assessment of housing needs and demands. Housing market analysis and related studies, housing Finance Planning and Design criteria for housing forms and standards, housing densities, locations and Layouts Services and Community Facilities, Appraisal of existing housing options in Nigeria, private housing , cooperative housing and public housing. The concept of flexible controls and community guidance, spontaneous and squatter housing in Nigeria. Experience in housing selected developing countries, appraisal of official housing programmes in Nigeria through presentation of detail case study revealing its design, planning, finance, construction and management aspect. Highlighting problems and prospects.

URP 709: URBAN ECONOMICS

Measurement of economies activity levels in terms of products, income and employment product and income accounts, changes in economic structure and spatial patterns related with activities. Theories of economic development and their relevance at national, regional and settlement level in Nigeria e.g. stage theory, Export base Theory, Dynamic Growth theory, Regional Multipliers, Growth Pole theory, unbalance Growth Theory, theory of circular and Cumulative Causative and hypothesis of swash effects, models of Economic development and their applications in Nigeria context Growth of regions, trends in economic structure and factors leading to tertiarisation. Nature, causes and physical manifestation of poverty, characteristics and structure of rural economic problems. Priorities in rural development and strategies for development. Determinants of size and structure of urban size distribution.

URP 710: ENVIRONMENTAL ENGINEERING (Public Utilities)

Design and management of sewers, treatment, disposal and management of sewage. The management of solid waste, collection and disposal, Public health Laws, environmental issues, Case studies from Nigeria.

URP 711: PLANNING AND COMPUTER APPLICATION

History and development of computer, their relevance of computing technology to physical planning, hardware and software description. Computer-aided designs in planning. Introduction to computer hardware and software. Data processing and data coding, data analysis and statistical computing. Information processing, keying in of information, debugging, deleting and insertion, sample, programmes, practical exercises will be chosen to illustrate basic concept and use of computers. Further details on minicomputer and micro computer, handling SPSS (Statistical Package for Social Scientists) introduction to computer graphic computer aided Designs.

URP 712: COSTAL MANAGEMENT AND PLANNING

Definition of coastal area, Characteristics of coastal areas. The concept of coastal planning, the concept of coastal management. Coastal management issues - Population growth, Coastal use (sea port, barges, canals and jetties, impact of human use). Concept of Coastal planning and management. Theoretical basis of planning - rational planning, Incremental planning theory, Transactional planning, Adaptive planning, Responsive and radical planning theory. Peculiarities of Coastal areas. Ecological concept. Resources and conservation. Land Reclamation. Major costal management and planning techniques. Examination of both traditional and modern running techniques, administrative, social, technical. Coastal management in Nigeria, existing institutions, Problems and prospect - oil and gas exploitation and associate problems. Examination of the activities of the Niger-Delta Development Commission.

URP 713: APPLICATION OF GIS TO URBAN AND REGIONAL PLANNING

Definition of GIS. Functional element of GIS. Development of GIS. The geographical database, data Structure, Raster and Vector, Data acquisition, Data source, GIS / Remote Sensing Interface, pre-processing and data input. Data management, basic principle and data base management systems. Data manipulation and analysis. GIS analysis functions. Practical case analysis and demonstration.

URP 714: TOURISM AND RECREATION PLANNING

The meaning of tourism and regional / national development element of tourism. Historical development of tourism in Nigeria. Potential and functional tourism in Nigeria. Management and organization of tourism and related activities. Impacts of tourism on the national economy.

Development of tourist resource centre, design and implementation consideration. Definition of recreation and Assessment of supply and Demand for recreational resources. Recreation planning studies. The nature scope and strategies for recreation planning. Urban indoor and outdoor recreation, countryside recreation resources development and management. National, regional and local parks. Forest recreation. Management of recreation resources.

URP 715: HISTORY AND EVOLUTION OF PLANNING THOUGHT

The history and evolution of urban and regional planning thought in Europe, America and Africa. Planning as a distinct activity. Influence of 19th and 20th century concepts on modern urban and regional planning. The changing role of the planner and case studies of the planning process. spatial inequalities development planning, etc.

URP 716: URBAN RENEWAL

Comprehensive redevelopment. Factors and criteria for delimiting unit area. Site investigation and renewal strategies - total, cellular, selective infrastructure, upgrading, etc. Data collection analysis and design of alternative proposal based on different strategies. Urban renewal, property assessment procedures and compensation. Decrees 88 and urban renewal process. Renewal of central areas, methodology of central areas demarcation detailed study and design. Judicial power government in urban renewal matters. Community participation in Urban renewal with examples from both developed and developing countries. Urban renewal finance. Criticisms levelled against urban renewal and planning tools.

URP 717: POPULATION AND URBANISATION STUDIES

The nature, trends and patterns of urbanization in developing countries, classical models of urban spatial structure and factorial ecology. The city as a system and mathematical modelling of urban system. Planning standards and subdivision control, land policies/ownership patterns, land use estimation and projection methods.

URP 721: PLANNING STUDIO III

The purpose of the studio exercise is the practical application of principles and techniques of Regional Development Planning in selected planning region. It involves - Delimiting the region and studying its development problems, Identification and explanation of the aims and objectives of regional planning, Identification of survey methods and data collection, and Identification and evaluation of plans for a region or sub region.

URP 722: PLANNING PRACTICE

Law relating to plan preparation and such other legal provisions. Preparation of planning briefs, Tender

documents, Structure of the fees as prescribed by Government and Nigeria Institute of Town Planners. Planners from various types of professional services, code of conduct as prescribed by NITP / TOPREC. Role of NITP and TOPREC in promoting the planning profession in Nigeria, basic principle and techniques of managing a technical office- both private and public, initiation of a project preparation and submission of preliminary outline for the proposed project. Selection of project team. Various notifications before commencing the project. Approval of competent authorities, Planning Office procedures, Contract terms and condition and agreement, Code of professional conduct and business ethics.

URP 723: PLANNING SEMINARS ON CONTEMPORARY ISSUES

Presentation of seminars on approved topic selected by the various student – exposure to the modalities for reaction to feeling on planning research presentations. Development of academic professional skills in preparation and development of seminar papers.

URP 724: ENVIRONMENTAL PLANNING AND MANAGEMENT (EPM)

History and origin of environmental planning and management. Paradigms and urban management strategies, Concepts and workability of the EPM. Paradigm shift and basic outline of the EPM. Sustainable Cities Programme (SCP). challenge and dynamics of the EPM.

URP 725: PROJECT PLANNING, EVALUATRION AND FINANCING

The role of project in the wider context of urban, regional and national planning. Various technical, operational, financial and economic considerations crucial to project formulation and associated problems faced by planners. Techniques and method of project planning and evaluation. Project identification principles and public profitability, Project appraisal using such methods as Pay-back methods, Discount cash flow methods, Yield (Rate of Return) methods, Cash cost, etc. Project financing aspects of the course include Project selection and investment programming, feasibility study and report writing, sensibility analysis, choice of discount rate and cost capital. Analysis of financial conditions, risk and profitability approaches to risk/capital management. Others are Economic base of cities, municipal and local government authorities to invest in project, Fiscal planning programme, budgeting and financial planning choices, efficiency analysis, Equity implication of investment decision, Harmonization between investment decisions and physical development planning and implementation.

URP 726: RESEARCH TECHNIQUES AND METHODOLOGY IN PLANNING

The need for and purpose of research. identification and definition of planning problems, Some of information in planning; different research methods; Designing planning

research; Techniques of measurement and classification; Attributes of planning research problems. Meaning and formulation of hypothesis, Analysis and writing of research reports and documentation.

URP 727: RESOURCE PLANNING AND DEVELOPMENT

Environmental Determinism, probabilism and possibilism. Natural resource studies, stock and inventory or resources linkages. Technology and natural resources. Natural resources estimation procedures. Natural resources and economic growth. The concept of environmental and intergenerational resources equity. The world resources and population dilemma, Agenda 21, biodiversity, resources conservation and management issues, Environmental sustainability.

URP 728: REGIONAL ANALYSIS

The city as a system, Central place system and rank –sized relationship, The nature of regions, classical models, factorial ecology and micro-economic explanation of Urban and regional spatial structure, mathematical Advance treatment of central place systems. Von Thunen and Weberian location system, Location system, optimum partitioning of point set, the maximal covering problem. Industrial location theories and models; role of industrialization in development. Typology of industrial regions. Case studies of regional practice in both developed and developing countries, socialist and capitalist countries. Approaches to regional planning.

URP 729: SITE SELECTION

Definition of site selection. Factors to be considered in selecting a site to serve a given objectives and functional need. Site analysis. Investigation and analysis of a site - its topography, soil condition, ground water table, vegetation, microclimate and district features, the site plan, its scale and contents. Circulation and utility network. Site engineering, building lines, Setback line, frontage plot coverage, and design standards.

URP 730: ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Approaches to assessment of the impact of physical and socio-economic development project on environment. Justification of EIA measures, needs for policies on environmental protection, History of legislation on Environmental Impact Assessment in Nigeria, Problems and Prospect of EIA, Nuisance abatement and performance standards, Standard procedures and format for preparation and presentation of Environmental Impact Statement, Environmental Impact Studies; experience in U.S.A, U.K. and others, Relevant socioeconomic issues emerging from current practice in Nigeria and other developing countries in relation to the implementation of developing plans and application of EIA

URP 733: RURAL PLANNING AND DEVELOPMENT

The village as an organic entity. Rural-urban relationship, Contemporary functions. Of rural areas to urban areas. The rural -urban continuum, physical, social, and economic structure of a village. Problems of migration, village communities in Nigeria; their types and structure. Rural planning in relation to national and regional policies. Base principles of community development community development in relation too rural planning and housing self help techniques; role of voluntary organizations in community development, delineation of rural area for planning purpose, Rural settlement form, structure and function in different culture zones of Nigeria (with case studies in various major zones) factor affecting the site and location of rural settlements, village planning principles, institution basis for planning rural settlement, village regrouping, model, village planning and resettlement planning (with local examples).

URP 735: RESETTLEMENT PLANNING

The concept of resettlement. The social economic, administrative, psychological and political, issues in resettlement planning and executing of resettlement planning and executing of resettlement procedures. Case studies of resettlement to Kanji, Abuja FCT, etc. Land design, claims and legal aspect of resettlement, project execution, compensation, procedures and options.

URP 799: DISSERTATION/ PROJECT

This is an independent research project that must make substantial contribution to knowledge. Each student is required to prepare a dissertation on the topic of his / her choice as approved by the department. He / she defend the same at the end of the course before a jury of examiner appointed by the department. The dissertation is to provide an opportunity for each student to undertake an in-depth and original study and research in the field of interest. The dissertation also provides an opportunity to synthesize the knowledge and skills acquired through the learning of various theories and practice during the course. Each student will prepare the dissertation under the guidance of advisor appointed by the department. The dissertation should be neatly presented in the form of drawings, sketches, photographs and models , etc. and supplemented by a well-illustrated and comprehensive report of not less than 5,000 words.

B. Master of Technology (M.Tech) Programme in Urban and Regional Planning

1.0 Philosophy and Objectives

The M.Tech (Urban and Regional Planning) programme offers an educational opportunity designed to meet the specific needs of graduates of Social Sciences and other approved related disciplines in becoming professional town planner as well as providing advance education qualification to register Town Planner at postgraduate degree level. The curriculum

for the programme focuses on providing the basic conceptual knowledge and analytical skills required to provide feasible solution to problems confronting our environment. It is both academic and a professional postgraduate degree programme designed to qualify its holder to become corporate members of the Nigerian Institute of Town Planners (NITP) and be able to register as Town Planner, with the Town Planner Registration Council of Nigeria (TOPREC). This is after the 2-year post qualification experience and passing the prescribed professional qualification examinations. The Department of Urban and Regional planning is housed within the school of Environmental Technology.

The content and structure of the programme prepare the students for the various professional challenges that lie ahead of them. The students are prepared both for rigorous academic and intellectual demands that the unit environment is known for. The department has a full complement of qualified, topflight practitioners made up of nineteen full-time academic staff. Nine of these are fully registered with the Nigeria institute of Town planners (NITP) and fifteen with the Town planners Registration Council of Nigeria (TOPREC). The Department has facilities such as designed studios, library, computer centre and other planning education paraphernalia.

The objectives of the programme are:

- 1 To produce a pool of professional graduates of Urban and Regional Planning capable of handling planning policy matters at national, regional and local levels.
- 2 To provide opportunity to social sciences graduates of related professional discipline to train as professional town planner.
- 3 To provide higher calibre graduates who can provoke intellectual debates and evolves theoretical philosophical concepts for the expansion of frontier of knowledge in Urban and Regional planning

2.0 Admission Requirements

Applicant for the M.Tech (Urban and Regional Planning) programme in addition to satisfying the general University regulations for admission should posses any of the following qualifications:

- (i) B.Tech degree in Urban and Regional Planning with at least second class honours of the Federal University of Technology, Akure or its equivalent from other recognized Universities.
- (ii) B.Sc degree with a minimum of second class honours in Social Sciences of approved related disciplines
- (iii) Postgraduate Diploma in Urban and Regional Planning with at least Upper Credit grade.

3.0 Duration of Programmes:

The M.Tech (Urban and Regional Planning) runs for minimum of 18 months. It is based on course unit system where the number of contact hour is paramount as the deciding factors

4.0 Requirements for Graduation:

Student shall be evaluated using examination and course work assessment. In every semester, two examinations are conducted these are the mid-semester examination and the final semester examination that covers the entire syllabus on the course in the semester. There is also a continuous assessment which takes different forms such as term paper, short test, and seminar papers, etc.

In the case of studio design work, a life project is selected which normally allows the student to face the reality on the field. A mid jury is conducted on every design project. Planning practitioners are invited to form part of the assessors for the final jury. Due to inconsistency in the duration of the academic session as a result of unpredictable incessant strikes by universities labour union, the 3-month intership initially slated for the vacation after the first academic session into the programme, has been shifted to the fourth semester which was initially designed only for the conduct of the independent research work on the M.Tech dissertation.

During the conduct of the research, students are expected to present three seminar papers (proposal seminar, pre-survey seminar and post survey seminar). Students shall defend the M.Tech dissertation before a panel of examiners constituted by the Examination Board of the postgraduate school, headed by an external examiner, who should be a seasoned academia and registered Town Planner

Apart from satisfying other University regulations, the student must have successfully presented three(3) seminars – project proposal, project progress report, and end of project report (i.e. post-survey report) at the School of Environmental Technology, Postgraduate Seminar before the final thesis defence (oral examination). A thesis describing the original work carried out while studying for the degree and written in the format specified by the School of Postgraduate Studies must be submitted at the end of the programme. After submission of the thesis, the candidate will be examined orally by a Panel of Examiners according to the regulations of the Postgraduate.

COURSE OUTLINE:

M.Tech I First Semester Core Courses

Course Code	Course Title	L	T	P	U
URP 801	Principles of Urban Planning	2	1	0	3
URP 803	Housing	2	1	0	3
URP 805	Planning Studio I Basic Design Studio	0	0	9	3
URP 807	Environmental Engineering	2	0	3	3
URP 809	Transportation Planning	2	0	3	3
URP 813	Population and Urbanisation Studies	2	0	3	3
Total		10	3	15	18

Electives (select one)

Course Code	Course Title	L	T	P	U
URP 815	History of Urban and Regional Planning	2	1	0	3
URP 817	Natural Resources Planning and Development	2	1	0	3
URP 819	Site Selection and Planning	2	0	3	3
Total					21

M.Tech I Second Semester Core

Course Code	Course Title	L	T	P	U
URP 802	Principles of Regional Development Planning	2	1	0	3
URP 804	Theory and Philosophy of Planning	2	1	0	3
URP 806	Research and Quantitative Techniques in Planning	2	0	3	3
URP 808	Project Planning and Evaluation	2	0	3	3
URP 810	Planning Studio II	0	0	9	3
URP 812	Planning and Computer Technology	2	0	3	3
URP 814	Coastal Management and Planning	2	0	3	3
Total				12	2
				21	21

Electives (Select one)

URP 816	Rural Settlement Planning	2	0	3	3
URP 818	Urban Analysis	2	1	0	3
URP 820	Housing Development Process	2	1	0	3

M.Tech II First Semester Core

Course Code	Course Title	L	T	P	U
URP 821	Application of Geographical Information System to Urban and Regional Planning	2	1	3	3
URP 823	Planning Law and Administration	2		0	3
URP 825	Advanced Studio Design (Planning Studio iii) Regional Plan Making	0	0	9	3
URP 827	Environmental Impact Analysis	2	0	3	3
URP 829	Professional Practice And Ethics	2	1	0	3
URP 831	Independent Work On Nigeria Problem Seminar	1	3	0	3
Total					18

Electives (Select one)

Course Code	Course Title	L	T	P	U
URP 833	Tourism and Recreation Planning	2	0	3	3
URP 835	Urban Renewal Techniques	2	0	3	3
URP 837	Landscape Planning and Design	2	0	3	3
URP 839	Public Transportation planning and Administration	2	0	3	3
Total					21

M.TECH II SECOND SEMESTER

Course Code	Course Title	L	T	P	U
URP 899	Master's Thesis	0	0	36	12
URP 844	Internship	0	0	9	3

COURSE SYNOPSSES
URP 801: PRINCIPLE OF URBAN PLANNING

Classical theories models of urban structure and growth. The fundamental components of urban space and areas viz Residential, commercial, Recreational, Circulation, Public use, and open spaces. The core-periphery relationship and urban transportation. Location criteria and allocation standard for urban land use element, Introductions to population dynamics and growth urban employment planning and facilities. The concept of Great city/Twin city.

URP 802: PRINCIPLES OF REGIONAL DEVELOPMENT PLANNING

The concept of a region - formal, functional and planning region. The central Place Theory, its application to the sub region space in Nigeria. Theories of regional development; Growth pole, point, centre, core-periphery, and its variation. Traditional and modern regional development strategies especially in developing countries.

URP 803: HOUSING ANALYSES AND POLICY

The universality of housing problems, housing market analysis, housing demand and supply concept. Situations in selected European countries like Russian, Britain, France, USA are considered. The assessment of housing needs, housing and national Economy. Housing as subsystem in the urban system, housing and urban Renewal, Housing programmes in developed and developing economics, housing finance instrument and intermediation.

URP 804: PHILOSOPHY AND THEORY OF PLANNING

The nature of planning philosophy in relation to methodology, techniques and designs. Procedural and Substantive Planning Theories, Comprehensive Planning, Incremental Planning, Advocate planning, System planning, etc. The Traditional Planning Process, Master Planning, Structure Planning, Local planning philosophy, traditional capitalist and socialist economics, Citizen Participation and Community involvement in the planning process. The relationship between physical and economic planning

URP 805: PLANNING STUDIO I

The concept of minimum and desirable space allocation standards, visual elements, in urban Complex. Design resource Composition, Space articulation and aesthetic

qualities. Selected site planning and design project for residential, agricultural commercial, recreation, commercial transportation and public land use. Students are required to hold a design portfolio of substantial site plans and drawings of good quality at the end of the course. Application of Computer Aided Design (CAD) to Neighbourhood or Estate Design in Urban & Regional Planning.

URP 806: RESEARCH AND QUANTITATIVE TECHNIQUES IN PLANNING

Formulation of Research problems focus and justification. Formulation and test of research hypothesis, Sources and importance of data for planning, Data availability and initiatives. Survey of literature Techniques. Social survey methods, Observation, Interview, Questionnaire. Sampling procedures: target population sampling frame size and techniques survey administration, cost and time scheduling. Data collection, data coding, data analysis, storage and retrieval. Use of parametric and non-parametric, measures dependent and independent variables of research, multivariate Techniques.

URP 807: ENVIRONMENTAL ENGINEERING

Design standard criteria for public utilities and infrastructure Networks. Water Supply, Sources, Treatment and Distribution, Electricity Generation, Transmission, Substation and Distribution. Design and Management of sewer. Sewage Generation, Conveyance, Treatment methods and Effluent Disposal. Solid Waste collection and Disposal. Environmental pollution and degradation in cities Public Health laws and management in Nigeria.

URP 808: PROJECT PLANNING AND EVALUATION

Identification and formulation of a project, Analysis of a project, definition of a project, private and public profitability, project Appraisal techniques; D.C.F. and D.R.F analysis and measures of profitability. Need for cost benefit analysis, social objectives and notion of accounting pricing. Applicability of cost-benefit analysis in Nigeria. Standard presentation of cost-benefit analysis. Project evaluation, project choice and design, decentralized evaluation. Selection of project and investment programme, feasibility study and report, Sensitivity analysis - its uses and mis-uses. Uncertainty - varieties and description, investment decision under uncertainty.

URP 809: TRANSPORTATION PLANNING

Transportation and land use connection. Population distribution and Economic activities in relation to transportation, Traffic generation distribution, modal split and Assignment Method of traffic forecasting, Origin and Destination Surveys Factors of Road alignment; designs speed, design volume and concentration, Sight Distance, lanes and carriage ways, transportation financing and Administration. Road Safety Regulations in Nigeria.

URP 810: INTERMEDIATE DESIGN STUDIOS (PLANNING STUDIO II)

Procurement of sites, site survey and base maps. Site visit, preliminary assessment and charting of recent development site upgrading. Road and Reticulation system. Location of technical and social Infrastructures. Plot subdivision block and plot numbering, colouring. Technical report writing. Oral presentation of a comprehensive master plan or Newtown for selected sites. Block models of selected presentations.

URP 812: PLANNING AND COMPUTER TECHNOLOGY

The relevance of computing technology to Physical Planning. Computer-Aided Design in Planning. Introduction to traditional programming packages and languages like COBOL, FOTRAN, etc. Data coding and data processing procedures. Data Analysis: Use of some packages like S-plus, SPSS, Minitab, etc. Statistical Computing, pictorial output, data structures. Practical exercises will be chosen to illustrate basic concepts and uses of computer.

URP 813: POPULATION AND URBANIZATION STUDIES

Introduction to Population and Demographic Studies. Population characteristics, sex, age, occupation, population pyramidal Structure in developed and Developing Countries population dynamics, crude birth and rates, age specific, birth and death rates, cohort models, population forecasting methodologies, The nature treads and pattern of mechanization in developing countries with specific references to Africa and Nigeria . Factors of Urbanization in developing countries, Migration studies, The world population trends, future population explosion and dilemma.

URP 814: COASTAL MANAGEMENT AND PLANNING

Definition of coastal areas; characteristic of coastal areas. Coastal management issues. The need for coastal planning population growth. Coastal use - Resource exploitation (fisheries, forestry, gas, oil). Infrastructure - transportation, ports, harbour, shorelines protection works and defence. Tourism and recreation. Conservation and reserve and protection of biodiversity. Impact of human use - pollution, industrial sewage and run/off. Coastal hazards and climatic change. Administrative issues. The concept of coastal planning. The concept of coastal management. Placing emphasis on integration. Major coastal management planning techniques Administrative - Policy and legislation, guideline, zoning, regulation and enforcement Social. Customary (traditional) practice. Collaborative and community-base management. Capacity building. Recreation and tourism management. Environmental Impact Assessment (EIA) of Coastal Project. The need for EIA. Steps in the EIA process, Operational EIA, integration of EIA with planning. Risk and hazard assessment and management of Coastal areas. Landscape and visual resource analysis. Economic Analysis.

URP 815: HISTORY OF URBAN AND REGIONAL PLANNING

This historical evolution of Town and country planning in Europe, America and Nigeria as a case study. Survey of human settlement and their spatial forms from the medieval period to the present. Comprehensive assessment of present third world settlement and those of the industrialized countries before the 1st world war, 19th and 20th century thought and concept of modern planning , spatial inequalities and evolution of region and national development planning. The evolution of regional development theories and instrument. History of Urbanization in Nigeria.

URP 816: RURAL SETTLEMENT PLANNING

Identification of rural settlement problems, uses, spatial, social and technological. Village survey - forms and facilities and characteristic studies. Policy, principles and strategies in Nigeria ADP, Farm settlement, River Basin Authorities, Better Life, DFFRI etc.

URP 817: NATURAL RESOURCES PLANNING AND DEVELOPMENT

Environmental Determinism, Probabilities and Possibilism, Natural resources studies, stock inventory, sources, linkages, Technology and Natural Resources. Natural resources estimation procedures, Natural resources and Economic growth. The Concept of environmental and Intergenerational resources equity. The world resources and population dilemma, Agenda 21, Biodiversity, Resources Conservation and Management issues, Environmental sustainability.

URP 818: URBAN ANALYSIS

The nature of cities, classical models of urban spatial structure and factory ecology. The analysis of urban population densities and ecological succession. Relevant economic theories to guide growth e.g. Stage theory, export Base theory, sector Theory, aggregate growth models. Core-periphery models, Growth Pole theory, Circulation, cumulative causation models, Social area Analysis. Central place theory, rank size Rule and Urban privacy. Economic Base studies, Retail and trading Market function. City delineation. City as a system within cities. City ageing, gentrification and renewal system.

URP 819: SITE SELECTIONS AND PLANNING

Site analysis and investigation, Site vegetal cover micro-climate, soil condition and capacity, ground water geological structure and mineralogical composition. Comprehensive geographical information system. The role of Aerial photographs and information. Factor, criteria and standard for site selection for functional activities. Site plane scale, circulation and utility networks, Design standards for building lines Setback and plot coverage.

URP 820: HOUSING POLICY AND DEVELOPMENT

Housing within the context of National Development planning.

Housing policy in Britain, USA and China. Housing problems, need and demand and supply in Nigeria. Housing finance, Institution, Instrument and Innovations in Nigeria. Innovative strategies for housing in developing countries. Housing policy and programme in Nigeria pre and post independence. The 1991 housing policy in Nigeria. Fringe housing, upgrading and housing project for low-income groups.

URP821: APPLICATION OF GIS TO URBAN AND REGIONAL PLANNING

What is GIS? Functions and elements of GIS. Development of GIS. The geographical Database, Data structure, Raster and vector, data acquisition, Data source, GIs /Remote Sensing interface, Pre-processing and data Input. Data management, Basic Principle and base management system. Data manipulation and analysis. GIS analysis function. Trends of output products. GIS projects design and execution.

URP 823: PLANNING LAW AND ADMINISTRATION

Introduction to the Nigeria legal system: Judicial Structure. The purpose and basic principle for legislation in planning in USA, UK and Nigeria. Detailed study of Health code, planning legislation and building code in U.K.and Nigeria. The act of planning, review and approval. Process of land-use planning. Laws on compensation and compulsory acquisition with special reference to Nigeria. Judicial case of settled land related conflict in Nigeria. The enforcement of developing control zoning laws and regulation. The 1992 Urban and Regional planning ,laws as it affects planning in Federal, State and Local Level. Local government reform in Nigeria and Effects on Urban Planning. National Environmental Protection agency Acts and Laws and their relevance to the planning process. The current trends in Planning Laws in the study.

URP 825: ADVANCE DESIGN STUDIO (PLANNING STUDIO III)

The basic project for the course shall be the design or regional plans; Collection, Collation and study materials for existing situation in the region of study; Preliminary situation visit to relevant sites in the study area; Design and administration of research instrument to collect socio-economic data; Data Processing and Analysis; Costing and implementation criteria and report writing.

URP 827: ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Possibilism and determinism. Definitions and significance and scope of ecology. Examination of the analysis for Environmental Impact Assessment studies. Environmental quality standards. Pollution control. Environmental Protection Feasibility studies. Institutional and Intergovernmental Arrangements. Monitoring and Evaluation. The Relevance of EPA Decree 86 in Nigeria.

URP 829: PROFESSIONAL PRACTICE AND ETHICS

The roles of the planner in government and private sector. The emergence, organization, and function of the Nigeria Institute of Town planner (NITP). The Town Planning Registration Council of Nigeria (TOPREC) Law. The relationship of NITP to sister professional bodies. The organization of planning office. The planning consortium, conditions and agreements. Preparation of planning briefs, structure of professional fees, code of conduct and professional Ethics. Procedures for project team selection, stages of project approval and verification and Project assessment by client authorities. Politics and Planning in Nigeria.

URP 831: URBAN AND REGIONAL PLANNING SEMINARS

Each student is expected to select topics that deal with typical planning problems in Nigeria for research. The research must be original, well-researched and neatly packaged for oral presentation in planning seminar series. Oral presentation mid semester assessment.

URP 833: TOURISM AND RECREATION PLANNING

Definition of Tourism and Recreation. Estimating demand for tourism and recreation, Key factors. Historical and key tourist centre in Nigeria. Design and location of public recreation facilities. Problems and management issues of Recreational resources in Nigeria. Tourism and Recreational resources and characteristics. A visit to local tourist centres such as Ikogosi warm Spring, Oke Maria, idanre hills, etc will be organized. Student must present reports of such visitation.

URP 835: URBAN RENEWAL TECHNIQUES

Comprehensive re-development factors and criteria for delimiting unfit areas. Site investigation and renewal strategies, total, cellular, selective, infrastructure, upgrading, etc. Data collection analysis and design of alternative proposal based on different strategies. Urban renewal, property assessment procedures and compensation. Community participation issues ion the urban renewal process in Nigeria, renewal of central areas; Methodology of central demarcation, detailed study and design. Judicial powers of government in urban renewal matters. Public participation in Urban

Renewal in developed and developing countries. Urban renewal finance in developing and developed countries.

URP 837: LANDSCAPE PLANNING AND DESIGN

Relationship of landscape design and planning to town planning. Historical evolution of public parks and recreational areas. Introduction to landscape materials, construction techniques like land grading, Structural elements and plant. Landscape planning process, site inventory, analysis, design programmes, illustrative Landscape design. Practical Project of landscape planning to land use plan in order to secure a planned, ordered and attractive urban environment. Landscaping of central areas of Town and Cities. Urban design realities- use of voids in relation to circulation and amenities. Landscaping and city image in Nigeria.

URP 839: PUBLIC TRANSPORTATION PLANNING AND ADMINISTRATION

Public transport system - road, rail and water, administrative organization structure. Fare structure collection system. Inter change facilities. Demand and supply of public transport. Criteria for route in various land use, highway design and traffic management for road. Public transport, rural transport services, subsidies and other sources of revenue for public transport. Public transport in planning process. Legislation issues.

URP 844: INTERNSHIP

Attachment to a planning agency under the supervision of registered and practicing planners. It is a 3-month attachment with periodical visitation by supervising lecturers. A report is expected to be presented at the end of the training by the student.

URP 899: MASTER'S THESIS RESEARCH PROJECT (12 UNITS)

An independent research project that must make substantial contributions to knowledge in general and professional of Urban and Regional Planning in particular. During the course of conduct the research each student is expected to represent three seminars on the research of the student is expected to present three seminars on the research study. These are proposal Seminars, Pre-survey Seminars and Post-survey seminar. The dissertation prepared would be defended before the PG Board constituted examination for the department.

DOCTOR OF PHILOSOPHY (Ph.D) PROGRAMME IN URBAN AND REGIONAL PLANNING

1.0 Programme Philosophy

The Doctor of Philosophy (Ph.D) degree in Urban and Regional Planning is purely by research geared towards preparing students for advanced research and academic career in applied Urban and Regional Planning. The Ph.D would be awarded on the basis of a thesis that represents the outcome of a research, relevant to the principles and Practice of Urban and Regional Planning. The programme will also embrace a specially designed programme of research training through regular staff/postgraduate seminars efforts of students and staff are discussed.

Academic Staff List

S/N	Name	Qualification	Status	Specialization
1	Prof. F.K. Omole	B.Sc, MURP, Ph.D, MNITP, RTP	Professor	Environmental Law and Theory of Planning
2	Prof. D.O Olanrewaju	M.A. Ph.D MNITP RTP	Professor	EIA, Tourism, Environmental Planning Management
3	Prof. J.O. Fasakin	B.Sc, MURP, Ph.D, MNITP, RTP	Professor	Housing, Transport and Infrastructural analysis
4	Prof. J.A.B. Olujimi	MURP, Ph.D, FNITP, RTP	Professor	Regional Development Planning, Rural Planning and Planning Design.
5	Prof. E.E. Okoko	B.Sc, MURP, Ph.D, MNITP, RTP	Professor	Transport Planning and Quantitative Techniques
6	Prof. O.B. Akinbamijo	B.Sc, MURP, MNITP, RTP, Ph.D	Professor	Environmental Engineering and Gender Studies
7	Dr. A.E. Olajuyigbe	B.Sc, MURP, PG.DIP Ph.D, FNITP, RTP	Reader	Coastal Planning & Management and EIA
8	Dr. O.B. Basorun	B.Sc (Env. Res. & Mgt.) HND (URP), PGD (URP), MURP, MNITP, RTP, h.D	Reader	Regional Planning
9	Dr. M.A. Oyinloye	B.Sc., M.Sc. Ph.D	Reader	GIS and Environmental Planning
10	Dr. A.A. Emmanuel	B.Tech. (URP), M.Tech (URP), Ph.D, MNITP	Senior Lecturer	Computer Aided Design and Local Economic Development
11	Dr. M.O Alabi	B.Sc (Geo), M.Sc.(URP), Ph.D (URP), MNITP, RTP	Senior Lecturer	Land use and Planning Theory
12	Dr. O.M. Awodele (QSV)	B.Sc (QS), M.Sc (QS), MNIQS, RQS	Senior Lecturer	Construction Management and Construction Economics.
13	Dr. O.O. Popoola	B.Tech, M.Sc (R. Sens) Ph.D (Coastal Mgt.)	Lecturer I	Coastal Planning and Management
16	Dr. Rotowa	B.Sc. (Geo.), M.Tech (URP), Ph.D (URP)	Lecturer I	Environmental Planning & Infrastructure Management
17	Dr. Nwafor	BURP, Ph.D (URP)	Lecturer I	Environmental Planning and Management
18	Dr.(Mrs.) Olusa	B.Tech (URP) , M.Sc. (URP). Ph.D. (URP)	Lecturer I	Environmental Planning and Management/Gender Issues
19	Dr. Owolabi	B.Tech (URP), M.Sc. (URP). Ph.D. (URP)	Lecturer II	Housing
20	Dr. Owoeye	B.Sc.(Geo.), M.Tech (URP), Ph.D (URP)	Lecturer II	Urban Studies, Land Use Planning and Environmental Management

PROGRAMMES OFFERED

1. Postgraduate Diploma (PGD) Applied Geophysics
2. Master of Technology (M. Tech.) in Exploration Geophysics
3. Doctor of Philosophy (Ph.D.) Exploration Geophysics;

professional qualification.

- (b) Master of Technology (M.Tech.)

In addition to the general regulations and guidelines on admission, first-degree Graduates of FUTA or any other recognized University (with a minimum of second class, Lower Division) in the following:

- (i) Applied Geophysics
- (ii) Physics
- (iii) Mathematics
- (iv) Geology (a strong background in Mathematics is desired)
- (v) Engineering-based Courses e.g. Civil and Mining Engineering, etc.

AVAILABLE OPTIONS/SPECIALIZATION

- i) Petroleum Geophysics
- ii) Groundwater/Environmental/Engineering Geophysics
- iii) Mining Geophysics.

PHILOSOPHY AND OBJECTIVES:

The programmes aim at producing the necessary manpower needed for industrial, technological and academic development of the country in high-technology areas that depend on Applied Geophysics for self-reliance. They are also aimed at providing a broad-based training for professional and academic development of the country in the area of Exploration Geophysics.

ADMISSION REQUIREMENTS

- (a) Postgraduate Diploma (PGD)
Applicants for this programme should be Holders of:
 - (i) first degree in Physics/Earth Sciences or Engineering/Surveying with a minimum of a pass degree from a recognized University;
 - (ii) HND with a minimum of Lower Credit in Petroleum Engineering, Physics/ Electronics, Electrical/ Electronics, Geology, Mining or Geophysics from any recognized Institution of higher learning;
 - (iii) first degree in Education with either Physics or Mathematics as a major with a minimum of a second class Upper division; and
 - (iv) in exceptional cases, mature students with a minimum of ten years working experience and acceptable

Candidates with a minimum of Upper Credit at the PGD level in Applied Geophysics are also eligible.

- (c) Ph.D

The Ph.D degree shall normally be by research and specialized course work. Entry conditions shall include a minimum of cumulative 60% in course work and project at the Master degree level of this University or of any other recognized institutions. In addition, holders of the Master degree or its equivalent from other institutions may be required to audit and pass some courses, as may be prescribed by the Department.

DURATION OF PROGRAMMES:

- (a) Postgraduate Diploma (PGD)

The academic programme, which will be on a full time basis, includes a course work and a supervised thesis project and both will cover a period of at least three semesters. The project work will be done during the long vacation.

- (b) M. Tech.

Full-time: 18 months. Senate may approve an extension where necessary.

- (b) Ph. D

Full-time: 36 months.

Part-time: 48 months. Senate may approve an extension where necessary

Requirements for Graduation:

- (a) Postgraduate Diploma (PGD)

All students must take and pass all the core courses. All other courses (electives) are mandatory only for non-geologists and non-geophysicists. All other conditions specified by the Federal University of Technology, Akure or by the School of Postgraduate Studies for the award of PG diploma shall apply. Each candidate will be required to complete and pass a minimum of 45 units which must include 6 units of

2ND Semester

supervised project.

(b) M. Tech.

Prospective Master Degree graduates are expected to pass all the core courses as well as those under their respective options. They are also to successfully defend the thesis project before the internal and external examiners recommended by the departmental postgraduate Committee and approved by the School of Postgraduate board/Senate of the university.

(c) Ph.D

All candidates are expected to carry out original research projects, supervised by approved postgraduate lecturers and successfully defend same in accordance with the Postgraduate School regulations.

COURSE OUTLINE

(a) POSTGRADUATE DIPLOMA (PGD)
1ST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
AGP 701	Geophysical Time Series	2	0	3	3
AGP 703	Electrical Prospecting Methods	2	0	3	3
AGP 705	Borehole Geophysics & Radiometric	2	0	3	3
AGP 707	Magnetic Prospecting Methods	2	0	3	3
AGP 709	Seismic Refraction Methods	2	0	3	3
AGP 713	Geophysical Field Work	0	0	3	3
*AGP 715	Introductory Geology for Geophysicist 1	3	0	0	3
**AGP 717	Introductory Geomathematics I	3	0	0	3
Total					21

Restricted Elective

* Not for Geology and Geophysics graduates

** For Geologists

COURSE CODE	COURSE TITLE	L	T	P	U
AGP 702	Groundwater/Environmental Geophysics	2	0	3	3
AGP 704	Engineering Geophysics	2	0	3	3
AGP 706	EM Prospecting Methods	2	0	3	3
AGP 708	Seismic Reflection Prospecting Methods	2	0	3	3
AGP 712	Geophysical Seminar	0	0	6	2
AGP 714	Gravity Prospecting Methods	2	0	3	3
*AGP 716	Introductory Geology for Geophysicists 11	2	0	3	3
**AGP 718	Introductory Geomathematics II	2	0	3	3
Total					23

* Not for Geology and Geophysics graduates

** For Geologist

Third Semester

COURSE CODE	COURSE TITLE	L	T	P	U
AGP 799	PGD Research Project	0	0	0	6
Total					6

(b) (M.Tech.) 1ST Semester

Course Code	Course Title	L	T	P	Units
AGP 801	Electrical Methods	2	0	3	3
AGP 803	Geophysical Fieldwork	0	0	2	3
AGP 805	Research Methodology and Analysis of Expt.	2	0	3	3
AGP 807	Time Series Analysis and Inversion Theory	2	0	3	3
AGP 811	Exploration Seismology	2	0	3	3

AGP 815	Advanced Electromagnetic Methods	2	0	2	3
AGP 817	Advanced Gravity and Magnetic Methods	2	0	3	3
*Elective		2	0	3	3
	Total				22

Elective

Course Code	Course Title	L	T	P	U
*AGP 809	Geomathematics II	2	0	3	3
*AGP 813	Geology for Geophysicists	2	0	3	3

AGP 826	Integrated Mineral Exploration	2	0	2	2
AGP 828	Environmental Management for Mineral Resources Development	2	0	2	2
AGP 830	Tomographic Inversion	1	0	0	1
AGP 812	Graduate Seminar	1	0	0	1
	Total				15

Groundwater/Environmental/Engineering Geophysics Option

2ND Semester

Petroleum Geophysics Option

Course Code	Course Title	L	T	P	Units
AGP 802	Seismic Stratigraphy	2	0	3	3
AGP 804	Reservoir Geophysics	2	0	3	3
AGP 806	Offset-dependent Reflectivity	2	0	3	3
AGP 812	Graduate Seminar	0	0	0	1
AGP 808	Seismic/Petrophysical Data Analysis and Interpretation	2	0	3	3
AGP 814	Health Safety and Environmental Protection	2	0	0	2
	Total				15

Course Code	Course Title	L	T	P	U
AGP 832	Advanced Engineering Geophysics	2	0	3	3
AGP 834	Advanced Groundwater Geophysics	2	0	3	3
AGP 836	Advanced Environmental Geophysics	2	0	3	3
AGP 838	Shallow Reflection Seismic/Ground Penetrating Radar	2	0	3	3
AGP 812	Graduate Seminar	0	0	0	1
	TOTAL	8	0	12	13

MINING GEOPHYSICS OPTION

Course Code	Course Title	L	T	P	U
AGP 820	Mining Exploration and Evaluation Management	2	0	3	3
AGP 822	Logging for Mineral Exploration	2	0	3	3
AGP 824	Gravimetrics and Magnetic Methods in Mineral Exploration	2	0	3	3

COURSE CODE	COURSE TITLE	L	T	P	units
AGP 899	Master's Thesis Research Project	0	0	0	12

(c) (Ph. D.)

COURSE CODE	COURSE TITLE	L	T	P	Unit
AGP 999	Doctoral Research Project	0	0	0	12

(A) POSTGRADUATE DIPLOMA (PGD)**AGP701:Geophysics Time Series Analysis (3 -Units)**

Fourier Transforms and Waves: Convolution and Spectra; Sampled Data and Z-transforms; Fourier sums; Fourier and Z Transform; Correlation & Spectra. Convolution in the frequency domain; 2-D Fourier Transform; Signs in Fourier Transforms, Examples of 2-D Fourier Transform. Downward Continuation of waves; Dipping waves, Snell's waves, Continuation of Dipping plane waves, Downward continuation with Fourier Transform; Linear Filters and Convolution; Fourier Analysis, Filters in the frequency domain, Cross-correlation and autocorrelation, Deconvolution, Spiking Deconvolution, Dereverberation. Matrix Formulation methods and application to inverse modeling.

AGP 702 GROUNDWATER/ENVIRONMENTAL GEOPHYSICS (3 Units) 2–0 - 3

Application of geophysical methods in groundwater exploration. Aquifer detection in Basement Complex and Sedimentary areas. Geophysical techniques and field procedures used in mapping of geological structures useful to groundwater accumulation. Determination of aquifer characteristics. Relevant Borehole location strategy and case histories. Applications of geophysical techniques in environment pollution studies, saline water intrusion and mapping; determination of chemical pollution at industrial sites and delineation of chemical plumes, oil spillage, pollution and mapping.

AGP703: ELECTRICAL PROSPECTING METHODS (3 Units)

Fundamental principles, electrical properties of rocks and ores. Self potential Earth resistivity. Electric profiling and sounding computations. Interpretation of electric sounding. Electrical mapping and prospecting.

AGP704 ENGINEERING GEOPHYSICS (3 Units)

Shallow geophysical techniques for evaluation of engineering parameters; elastic co-efficients, geologic structure, groundwater, seismic hazard, regulatory criteria.

AGP705 BOREHOLE GEOPHYSICS AND RADIOMETRICS (3 Units)

- Concepts of the logging techniques. Electrical logging methods. Resistivity self-potential, Induced polarization, EM, Dipmeter, etc. Porosity logs-sonic, gamma ray, density, neutron logs, etc.; others and applications of geophysical logs in oil and groundwater exploration.
- Fundamental principles of radioactivity, nuclear disintegration, radioactive decay processes, radioactivity of rocks and minerals. Instrumentation and data interpretation. Case histories.

AGP 706E-M PROSPECTING METHODS (3 UNITS)

- Classification of EM methods. Amplitude and phase anomalies. Compensator method. Turam method, moving source and receiver methods. Transient induced polarization methods. Magneto-telluric methods. Application in resolving geologic problems.
- Classification of electromagnetic methods. Amplitude and phase anomalies, Compensator method. Turam method. Moving source and receiver methods. Transient induced polarization method. Magnetotelluric methods. Application in resolving geological problems.

AGP 707 MAGNETIC PROSPECTING METHOD (3 Units)

Introduction: Potentials; Fundamentals of magnetic dipole interactions with applications to simple mass distributions Gauss theorem, and the field equations. Magnetic instruments and data acquisition. Magnetic data reduction, interpretation of magnetic data and data adjustments. Interpretation of magnetic anomalies, isolation of anomalies; magnetic dip and depth estimates geologic examples.

AGP 708 SEISMIC REFRACTION PROSPECTING METHOD (3 UNITS)

Geophysics and reflected wave paths. Refraction, elastic constants, curved ray theory and applications. Seismic detectors, Field techniques reverse shooting, static and interpretation.

AGP 709 SEISMIC REFLECTION PROSPECTING METHOD (3 Units)

Oil demand and supply. Exploration activity and the place of Geophysics in Exploration, propagation of seismic waves. Analytical treatment of elementary seismic reflection problem. Field techniques and interpretation of modern seismic reflection section.

AGP 712 GEOPHYSICAL SEMINAR (2 Units)

Presentation by class members of material drawn from personal investigation or of material selected from geophysical literature.

AGP 713 GEOPHYSICAL FIELD WORK (3 UNITS)

An independent geophysical field studies lasting three to four weekends to be undertaken at the end of the first semester. The aim is to expose the students to practical field work. A report on the exercise must be written and submitted for assessment.

AGP 715 INTRODUCTORY GEOLOGY FOR GEOPHYSICISTS I(3 Units)

Introductory petrology- Rock types, origin, classification, composition and identification. Physical geology- weathering and weathering agents, transportation and deposition. Depositional environments. Basic principles of stratigraphy.

stratigraphic terms unconformities, Geological time. Minerals, industrial minerals uses. Introduction to structural geology-fold, faults, fractures, etc. Stress and strain analysis. Geology of petroleum.

AGP 714 GRAVITY PROSPECTING METHODS (3 Units)

Introduction: Potentials; Theory of attraction and potential with application to simple mass distributions; Theorems of Green and Gauss. The field equations. Green's formulae and equivalent surface layers. Potentials of double distributions, Harmonic functions. Instruments, data acquisition and reduction; regional and residual anomaly separation. Interpretation of gravity anomalies, depth and mass estimates; applications of gravity methods in mineral exploration, groundwater and geologic mapping.

AGP 716 INTRODUCTORY GEOLOGY FOR GEOPHYSICIST II (3 Units)

Basic map-reading -Type of maps, dip & strike; Geology cross-section. Hydrogeology-hydrological and cycle, water table, aquifer and types. Groundwater explorations. Engineering geology-Engineering properties of rocks, geological factors affecting engineering structures, influence of groundwater on engineering structures. Introduction to marine geology-sources of ocean water, structure and hypsography of ocean basins. Introductory photogeology. Geology of Nigeria-basement complex and sedimentary basin.

AGP 717 GEOMATHEMATICS I (3 Units)

Linear Equations, Non Linear Equations. General Theory of nth Order Linear Equations. Review of Matrices, Basic Theory of Systems of First Order Linear Equations. Inverses, Eigen-value and Eigen-vectors. Power Series. Sequence and Series. Limit, Continuity and differentiability of Functions. Differential Equations of First Order.

AGP 718 GEOMATHEMATICS II (3 Units)

Solutions of Laplace equations. Solution of Initial Value Problems; Step Functions, Impulse Functions. The Convolution Integral. Harmonic analysis. Kernel and Bessel's Equations. Euler Equations. Regression Analysis. Least Square Fitting Techniques, Taylors's Series. Differential Equations of Second Order.

AGP 799 PGD RESEARCH PROJECT (6 Units)

An independent research project chosen according to student interest and supervised by staff, during the final year. The subject must be related to any aspect of Applied Geophysics and its significance to the exploration programme of an oil, groundwater, mineral investigation, or Engineering Company.

(b) M.Tech

AGP 801 ELECTRICAL METHODS (3 Units)

Electrical potential theory, Spontaneous Potential, Induced polarization techniques of geophysical prospecting. Data collection, correction and consideration of specialized interpretation. Application of the electrical methods in geological mapping, mineral exploration, engineering site investigation, groundwater and geothermal energy investigation. Detailed treatment of case histories and class works.

AGP 802 SEISMIC STRATIGRAPHY (3 Units)

Seismic sequence analysis. Depositional unit delineation, correlation of sequences and mapping. Conversion from depth to time of core/sample well data. Seismic fades analysis -Analysis of reflection geometry, continuity, amplitude/frequency and interval velocity. Reflection character analysis: waveform, individual amplitude and frequency. Reconstruction of paleogeography and geologic history. Integration and interpretation of seismic sequence and fades. Play and prospect evaluation: definition, mapping and evaluation of potential reservoirs, source beds and seals for structural and Stratigraphic traps. Stratigraphic modelling - utilisation of seismic amplitude and waveforms contributions of modeling and wave-theory modeling. Qualitative and quantitative stratigraphic correlations. Generation of synthetic seismograms. Synthetic seismograms studies of thin beds.

AGP 803 GEOPHYSICAL FIELD WORK (3 Units)

A field course of about 10 days in exploration geophysics takes place at the end of the first semester. Each student is expected to work on a given problem using integrated geophysical techniques. A report is expected to be submitted as the end of the course.

AGP 804 RESERVOIR GEOPHYSICS (3 Units)

Synergistic team approach to reservoir management. Elements of reservoir delineation, description and surveillance. Basic Petrophysics. Technologies of reservoir geophysics: 3-D and 4-D/Time-lapse seismic techniques. Vertical Seismic Profiling (VSP) techniques, cross-well tomography. Borehole logging techniques and interpretation. Geothermics - using temperature in hydrocarbon exploration and gamma ray spectrometry. Case histories.

AGP 805 RESEARCH METHODOLOGY AND ANALYSIS OF EXPERIMENTS (3 Units)

Objectives and scope of research. Modeling. Research procedure and material selection. Preparation of reports. Definition of statistical terms. Representation of numerical data. Measures of dispersion. Distribution; binomial, Poisson, normal statistical significance; normal distribution tests, Confidence limit and confidence interval, least significant difference, test, x-test. Regression and correlation. Comparative experiment; replication,

randomization, least squares, balance incomplete block design. Factorial experiments.

AGP 806 OFFSET-DEPENDENT REFLECTIVITY (3 Units)

Introduction - Theory and practise of AVO analysis. Rock properties and petrophysical basis of AVO response. Mathematical principles of AVO. Approximation of Zoepritz's equations. The Gassmann equation. Assumptions of Gassman equations. Gassmann substitutions and regression. AVO classes and crossplots. AVO attributes- Lambda, Mu and Rho. Attribute maps. Background normal calculations/ intercept and gradient calculations. Inversion of P-wave AVO. Multicomponent AVO. Seismic data processing for AVO and Amplitude variation with Angle (AVA) analysis. Interpretation of AVO data- Gas detection. Oil detection, Enhanced Oil Recovery (EOR) monitoring, Lithology identification. Porosity identification. Case histories.

AGP 807: TIME SERIES ANALYSIS AND INVERSION THEORY(3 Units)

Fourier Transforms and Waves: Convolution and Spectra; Sampled Data and Z-transforms; Fourier sums; Fourier and Z Transform; Correlation & Spectra. Discrete Fourier Transform; Fourier Transform as an invertible Matrix, The Nyquist Frequency, The Comb Function, Undersampled Field Data, Symmetries. Convolution in the frequency domain; 2-D Fourier Transform; Signs in Fourier Transforms, Examples of 2-D Fourier Transform. Downward Continuation of waves; Dipping waves, Snell's waves, Continuation of Dipping plane waves, Downward continuation with Fourier Transform; Linking Snell's waves to Fourier Transforms. Linear Filters and Convolution; Fourier Analysis, Filters in the frequency domain, Cross-correlation and autocorrelation, Deconvolution, Spiking Deconvolution, Dereverberation. Matrix Formulation methods and application to inverse modeling. Practical inversion problems in various geophysical methods.

AGP 808: SEISMIC/ PETRO-PHYSICAL DATA ANALYSIS AND INTERPRETATION (3 Units)

PC-based 2-D and 3-D seismic data analysis and interpretation. Identification of hydrocarbon indicators and fracture patterns. Generation of seismic attribute maps of horizons and intervals. 3-D grid depth conversion. Synthetic seismograms. Seismic volume rendering and extraction. Multitrace attributes -enhanced structural and stratigraphic interpretation techniques. Fault analysis. Petrophysical modeling. Facies modeling. Log editing. Well correlation. Software development. Seismic ties to well data; Logging tools, synthetic seismograms and tieing well data. Geophysical Interpretation: Quality control of survey and processing, reflection identification, mistakes and their causes; digitization, map construction, velocity maps and depth conversion, reporting and management presentation. Seismic interpretation exercise; Description of the data, Interpretation of the seismic lines, Features revealed by the seismic data. Geological interpretation: Lithological features of common sedimentary rocks. Depositional features of sedimentary

rocks. Deformation mechanisms.

AGP 809 GEOMATHEMATICS II(3 Units)

Linear Equations, Non Linear Equations. General Theory of nth Order Linear Equations. Review of Matrices, Inverses, Eigen-value and Eigen-vectors. Power Series. Sequence and Series. Limit, Continuity and differentiability of Functions. Differential Equations of First and Second Order. Solutions of Laplace equations. Step Functions, Impulse Functions The Convolution Integral. Harmonic analysis. Kernel and Bessel's Equations. Euler Equations. Regression Analysis. Least Square Fitting Techniques, Taylors's Series.

AGP 811 EXPLORATION SEISMOLOGY (3 Units)

Fundamentals and basic theory of Seismic waves. Plane and Spherical waves at an interface. 2-layer travel time curves. Multiplayer plane and dipping travel time curves. Refraction across faults. Velocity functions. Estimation of velocity as a function of depth. The Generalized Reciprocal Method (GRM) and depth sections. Static corrections: Elevation and weathering corrections. Up-hole survey. Interpretation of refraction field records. Up-hole survey and Reflection Seismic.

AGP 812 GRADUATE SEMINAR(1 UNIT)

Oral presentation describing results of published research work related to Exploration Geophysics. It is normally taken during the last semester of residence before a corresponding graduate degree is awarded.

AGP 813 GEOLOGY FOR GEOPHYSICISTS (3 Units)

Introduction to the basic principles of stratigraphy. Introduction to structural geology and interpretation for potential of mineral resources. Simple geological structures. Interpretation of folds, faults and fractures. Basic map reading, photogeology and interpretation. Introduction to petrology - igneous, metamorphic and sedimentary rocks. Identification of various rock types and their composition. Industrial minerals and their uses. Petroleum geology: hydrocarbon nature and accumulation. Origin, migration and accumulation of hydrocarbon. Discussion on various traps and salt domes. Basic concepts of Engineering/Hydro-Geology and marine Geology.

AGP 814 HEALTH SAFETY AND ENVIRONMENTAL PROTECTION (2 Units)

Current policy on environment and applicable laws. Environmental impact assessment (EIA): Principles and practice. Minimum impact approach to oil/gas exploration and exploitation operations. Oil spillage and remediation techniques. Waste management and disposal. Safety principles - safe and unsafe acts. First aid training. Cultural sensitivities In the areas of operation. Community liaison and crisis management procedure.

AGP 815 ADVANCED ELECTRO-MAGNETIC METHODS (3 Units)

Electromagnetic theory. Physical principles of electromagnetic methods. Maxwell's equations. Amplitude and phase anomalies. Classification of electromagnetic methods. Loop and cable methods. Application of electromagnetic methods in mineral and groundwater exploration.

AGP 817 ADVANCED GRAVITY AND MAGNETIC METHODS (3 Units)

Potential field theory. Fundamentals and practical field aspect of land, marine and airborne gravity and magnetic surveying. Interpretation techniques including filtering, continuation two and three dimensional map analysis. Rock magnetism. Resolution of anomalies. Limiting formulae. Gravity and magnetic effects of some simple models. Anomaly characteristics, depth rules. Computation of gravity and magnetic anomalies for irregular bodies. Regional, residual and vertical derivatives. Poisson's relation between gravity and magnetic potential.

AGP 820 MINING EXPLORATION AND EVALUATION MANAGEMENT(3UNITS)

Concept of Ore genesis, factors controlling deposition of metallic ores, metallogenic provinces and epochs. Physical and chemical properties, mode of formation and industrial uses of clay, sandstone, evaporites, coal, tar sand etc. Mineral deposits in Nigeria and other parts of the world; Mining methods, choice of mining methods, open-pit and underground mining. Legal Aspect of exploration; Professional guidelines and communication skills; Advance techniques, including estimations recoverable reserves and conditional simulation.

AGP 822 LOGGING FOR MINERAL EXPLORATION (3 UNITS)

Logging environments; Available types of logs; magnetic field logging; nuclear-magnetic-resonance log; susceptibility log, gravity logging, density log; Impact of digital logging systems; Examination of logging systems not presently used in non-petroleum areas. Qualitative and quantitative use of single and combination measurements; examination of representative logs; Criteria for evaluating and monitoring log quality, Practical problems to illustrate systems and methods.

AGP 824 GRAVIMETRICS AND MAGNETIC METHODS IN MINERAL EXPLORATION (3 UNITS)

Gravimeters and field operations; density data; sources and nature of gravity anomalies; gravity map filtering and contour programs; interpretation using computer modelling; borehole gravimetry. Magnetometers and field operations; magnetic susceptibilities; sources and nature of magnetic anomalies; magnetic map filtering; interpretation using computer modelling; vertical magnetic gradients. Validity of interpretations and quality control; feasibility studies; answer

to specific exploration questions; evaluation and critique of results.

AGP 826 INTEGRATED MINERAL EXPLORATION (2 UNITS)

Variety of targets and detection methods; Base-metal search; Factors affecting exploration work; Combination of integrated geophysical surveys; Airborne surveys; The principal geophysical techniques include, EM, ER, radiometric and seismic methods as applied to mineral exploration. Analyses of examples and problems; Choice of area; Site survey methods; geophysical techniques, interpretation of results.

AGP 828 ENVIRONMENTAL MANAGEMENT FOR MINERAL RESOURCES DEVELOPMENT (2 UNITS)

Analysis of the existing state; characteristics of the natural environment (geological environment, flora and fauna, morphological data, deposit characteristics, exploration methods, waste disposal sites, needs in water, Environmental problem definition, environmental management requirements; environmental background level; environmental impact analysis; evaluation of the differences among alternative ways of mining and recommendation.

AGP 830TOMOGRAPHIC INVERSION (1 UNIT)

Introduction to software and modelling, analysis of geophysical data and application in mineral exploration. The use of computer.

AGP 832 ADVANCED ENGINEERING GEOPHYSICS (3 Units)

The nature of engineering geophysics as a field. Applicable geophysical methods. Applications of engineering geophysics in engineering site investigations (foundation problems in buildings, roadways, dams etc., location of construction materials, corrosion surveys, dynamic vibration tests of structures, investigation of earth embankment). Structural Foundations; Types of foundations; Spread footings – bearing pressure, bearing capacity and settlement. Application of electrical resistivity method and its significance in lithology identification. Determination of geoelectric parameters (layer resistivity and thickness) and establishment of depth to bedrock. Relationship between resistivity and soil strength. Engineering applications of seismic refraction method. Relationship between P-wave velocity, S-wave velocity and soil strength. Determination of geo-velocity parameters and elastic coefficients (Poisson's ratio, RQD and rippability).

Applications of GPR in engineering site investigations. Geophysical investigations for coastal engineering works. Geotechnical engineering field studies: Field exploration, Groundwater monitoring, Laboratory testing, Analysis of subsurface conditions.

AGP 834 ADVANCED GROUND- WATER GEOPHYSICS (3 UNITS)

Applications of geophysical methods in groundwater exploration. Aquifer determination in Basement complex and sedimentary areas using electrical and seismic refraction methods. Mapping of geological structures useful to groundwater investigation. Determination of aquifer characteristics. Relevant geophysical techniques and field procedures. Borehole location strategy. Case histories. Coastal saline water intrusion mapping. Delineation of clay stratum in a saline water coastal environment. Delineation of fresh water aquifers in coastal environment.

AGP 836 ADVANCED ENVIRONMENTAL GEOPHYSICS (3 UNITS)

Scope of environmental geophysics. Objectives of environmental geophysics and the development of appropriate remedial alternatives. Important differences between the applications of geophysics for petroleum/groundwater and their hazardous waste site utility. Remedial Investigation/Feasibility Study requirements. Identification of geophysical methods utilized in environmental site characterisation. Ground penetrating radar, Electromagnetic induction, Electrical resistivity, seismic refraction, Magnetometer surveys. Determination of soil corrosivity, overburden protection capacity, hydraulic conductivity, coefficient of anisotropy and their uses in soil characterization and aquifer protection. Geophysical well logging for evaluating hazardous waste sites: General geophysical well log interpretation. Relative well log responses in selected sediments. Porosity determination. Fracture detection. Water levels. Measuring fluid flow. Logging above the water table (gamma ray, resistivity, neutron-neutron, density). Field recording systems. Explanation of individual measurements (calliper, SP measurements, resistance, density, resistivity and conductivity, acoustic velocity, induced polarization, gamma ray, neutron-neutron, deviation, dipmeter, magnetic susceptibility, acoustic televiewer

AGP 838 SHALLOW SEISMIC REFLECTION & GROUND PENETRATING RADAR (3 UNITS)

Comparison of shallow and deep seismic reflections. Highlight of the important variations of the physics of the earth between shallow and deep seismic reflections. Energy sources and field techniques. NMO corrections. Optimum window technique in engineering, environmental and groundwater applications with CMP processing. Effects of soil-moisture content on shallow seismic data. Shallow S-wave survey. Operational problems of shallow S-wave survey. Uses of diffractions for delineating near-surface objects and voids. Comparison of SSR with GPR. Applications of shallow 3-D seismic in engineering investigations. Limitations of SSR. Interpretation techniques in shallow seismic reflection and case studies. Application of radiowave methods to rock investigations and historical development of ground penetrating radar (GPR). Theoretical Principles. Instrumentation, field procedure and data presentation.

Attributes of GPR. Field operational problems of GPR. Processing and interpretation of GPR data. Applications: Soil investigations, soil surveys and site investigations, survey of sand and gravel resources, peatland investigations; Bedrock Surveys: bedrock mapping, bedrock construction, building stone exploration; Groundwater studies: River and lake investigations; Site Investigations: Roads, railways and bridges; earth dams, landfill areas; Concrete Structures; Municipal engineering; Environmental studies; Archeological and other investigations.

AGP 899 MASTER'S THESIS RESEARCH PROJECT (12 UNITS)

A Dissertation on a subject related to any of Applied Geophysical methods and its significance to the exploration programme of an oil, groundwater, mineral investigation, or engineering company.

SERVICE COURSES IN GEOPHYSICS FOR APPLIED GEOLOGY AND ENGINEERING STUDENTS

AGP 841 GRAVITY AND MAGNETIC METHODS (3 Units)

Introduction to Gravity Theory: First principles; importance of lateral density contrast. Anomaly characteristics and their relationship to source parameters. Introduction to Magnetic Theory; first principles. Dipole theory and lateral susceptibility contrast. Anomaly characteristics and their relationship to source parameters comparison/contrast of magnetics and gravity. Types of gravity and magnetic surveys. Consideration of survey design. Gravity and Magnetic field effects of some simple models. Map interpretations. Identification of structural trends, faults, basement fabric, igneous activity.

AGP 842 SEISMIC PROSPECTING METHODS (3 Units)

The place of geophysics in Oil Exploration Elastic Constants. Waves Types; refracted and reflected wave paths; curved ray theory. Seismic refraction field techniques and applications.

AGP 843 ELECTRICAL AND ELECTROMAGNETIC METHODS (3 Units)

Fundamental principles. Electrical properties of rocks and ores. Introduction to Electrical profiling and sounding. Applications to Engineering, Groundwater and Mineral ore. Classification of EM Methods. Amplitude and Phase Anomalies. Compensator Turam Method, moving source and Receiver methods. Applications in Groundwater and mineral prospecting.

AGP 844 GEOPHYSICAL BOREHOLE LOGGING TECHNIQUES (3 Units)

Fundamentals of log interpretation. Formation parameters and their interrelationships. Electrical logs: spontaneous

potential logs, Resistivity logs, induction logs, radiometric logs, Acoustic logs, Caliper logs, sonic logs, litho logs, etc. Applications of geophysical logs, oil Gas, Groundwater and Environmental pollution.

presented in form of a thesis using approved format. Every candidate must present, at least, two successful seminars before submission of PhD thesis report for examination.

c) (Ph. D)

AGP 999 DOCTORAL RESEARCH (12 UNITS)

Original research project, which must involve independent geophysical investigations in any of the listed fields, should make new and significant contributions to the understanding and knowledge of Applied Geophysics. The report should be

9.0. ACADEMIC STAFF LIST

S/N	Name	Qualification	Status
1	Prof. P.A. Enikanselu	B.Sc. (Nsukka), M.Sc. (Ife), PhD (Akure)	HOD / Professor
2	Prof. S. B. Ojo	B.Sc. (Phy), M.Sc. (Phy) (Zaria), PhD (Geophysics, London)	Professor/on Sabbatical
3	Prof. (Mrs) M.T. Olowokere	B.Tech.; M.Tech., PhD (Akure)	Professor
4	Dr. G.O. Omosuyi	BSc., M.Sc. (Ibadan) PhD (Akure)	Reader
5	Dr. M. I. Oladapo	HND (Yaba); B.Tech. M.Tech; PhD (Akure)	Reader
6	Dr. G.M. Olayanju	B.Tech. M.Tech; PhD (Akure)	Senior Lecturer
7	Dr. M. Ayuk	BSc. (Ife); M.Sc. (Ife); PhD (Akure)	Senior Lecturer
8	Dr. J. O. Amigun	B.Tech. (Akure); M.Sc. (Ife); PhD (Akure)	Senior Lecturer
9	Dr. O. J. Akintorinwa	B.Tech; M.Tech; PhD (Akure)	Senior Lecturer
10	Dr. S. Bayode	B.Sc. (Ado-Ekiti); M.Tech., PhD (Akure))	Senior Lecturer
11	Dr. K.A.N. Adiat	BSc. (Ife); PGD; M.Tech. (Akure), PhD (Malaysia)	Lecturer I
12	Dr. K.A. Mogaji	B.Tech. M.Tech. (Akure); PhD (Malaysia)	Lecturer I
13	Dr. I.A Adeyemo	B.Tech; M.Tech., PhD (Akure)	Lecturer I
14	Dr. J. N. Ogunbo	B.Tech. (Akure); M. Sc. (ETH Zurich and RWTH Aachen), Ph.D. (USTC, China)	Lecturer II
15	Dr. B.A. Olisa	BSc.; M.Sc. (Ibadan); M.Tech., PhD (Akure)	Lecturer II
16	Dr. O. Abiola,	B.Tech., M.Tech., PhD (Akure)	Lecturer II

9.4.2 DEPARTMENT OF APPLIED GEOLOGY (AGY)

PROGRAMMES OFFEREDa. Postgraduate Diploma (PGD) in Applied Geology

b. Master of Technology (M.Tech.) with options in:

- (i) Mineral Exploration
- (ii) Remote Sensing
- (iii) Hydrogeology/Engineering Geology
- (iv) Petroleum/Sedimentary Geology

c. Doctor of Philosophy (PhD) with research in the following fields of specialization

- (i) Mineral Exploration
- (ii) Economic/Mining Geology
- (iii) Exploration Geochemistry
- (iv) Structural Geology
- (v) Remote Sensing
- (vi) Petroleum Geology
- (vii) Sedimentary Geology/Stratigraphy
- (viii) Hydrogeology
- (ix) Engineering Geology

in carrying out meaningful research of direct relevance to the society; and
establish link with relevant industries in the nation with a view to solving industrial practical problems.

ADMISSION REQUIREMENTS

a. Postgraduate Diploma in Applied Geology

A prospective candidate for the programme should possess minimum of either

- (i) a honours degree in any science-based or earth-related engineering field from any university recognized by Senate, or
- (ii) a higher national diploma or equivalent at lower credit level in Geology, Mineral Resources, Water Resources, Hydrology, Mining, Petroleum Engineering, Civil Engineering or Metallurgy from any recognized tertiary institution.

b. Master of Technology (M.Tech)

In addition to the general regulations and guidelines on admission, a candidate shall normally possess a minimum of:

- (I) Second Class Lower division degree in Geology from this university or any other university recognized by Senate.
- (II) Second Class Upper division degree in Applied Geophysics, Mining Engineering, Petroleum Engineering and Metallurgy.
- (III) a postgraduate diploma (PGD) in Geology at upper credit level along with any of the following qualifications: a Third Class division degree in Geology or HND lower credit in Geology or Second Class Lower division degree in any science-based or earth-related engineering field.

c. Doctor of Philosophy (PhD)

To qualify for admission into the PhD programme, a candidate must possess a Master's degree with a minimum of 60% grade each in the Master's course work and in the research project from any university recognized by Senate. The programme shall normally be by research and specialized coursework whereby holders of Master's degrees from institutions other than this university may be required to audit and pass some courses that may be prescribed by the department.

DURATION OF PROGRAMMES

a. Postgraduate Diploma in Applied Geology

This is a part-time programme and covers a period of 4 semesters. It runs only at week-ends, normally from Friday afternoon to Saturday evening but also on Sunday when necessary.

b. Master of Technology

Full Time: 18 Months.

c. Doctor of Philosophy

Full Time: 36 Months.

Part Time: 48 Months.

* Upon application, Senate may approve an extension where necessary.

REQUIREMENTS FOR GRADUATION

a. Postgraduate Diploma

Each student must register for and pass a minimum of 41 credit units, which must include 6 units of supervised research project.

b. Master of Technology

Each student must register for and pass a minimum of 46 - 48 credit units depending on option, and this must include 12 units of supervised research project.

c. Doctor of Philosophy

All candidates are expected to carry out original research projects supervised by approved post-graduate lecturers and successfully defend same in accordance with the post-graduate school regulations.

PGD Year II: 1ST Semester

Course Code	Course Title	L	T	P	U
AGY 711	Hydrogeology	1	0	3	2
AGY 713	Engineering Geology	1	0	3	2
AGY 715	Petroleum Geology	1	0	3	2
AGY 717	Economic Geology	1	0	3	2
AGY 719	Exploration & Mining Geology	1	0	3	2
	Total				10

2ND Semester

Course Code	Course Title	L	T	P	U
AGY 712	Geology of Nigeria	1	0	3	2
AGY 714	Geological Field Mapping	0	0	6	2
AGY 716	Seminar	0	0	3	1
AGY 799	PGD Research Project	0	0	0	6
	Total				11

COURSE OUTLINE FOR EACH PROGRAMME

a. Postgraduate Diploma

PGD Year I: 1ST Semester

Course Code	Course Title	L	T	P	U
AGY 701	Crystallography & Mineralogy	1	0	3	2
AGY 703	Igneous & Metamorphic Petrology	1	0	3	2
AGY 705	Sedimentology & Stratigraphy	1	0	3	2
AGY 707	Geological Map Interpretation	1	0	3	2
AGY 709	Introduction To Geostatistics & Computing	1	0	3	2
	Total				10

2ND Semester

Course Code	Course Title	L	T	P	U
AGY 702	Geochemistry	1	0	3	2
AGY 704	Structural Geology & Global Tectonics	1	0	3	2
AGY 706	Paleontology	1	0	3	2
AGY 708	Remote Sensing Techniques & Applications	1	0	3	2
AGY 710	Exploration Geophysics	1	0	3	2
	Total				10

b. M.Tech

(i) M.Tech Applied Geology (Mineral Exploration Option) 1ST Semester

Course Code	Course Title	L	T	P	U
AGY 801	Mineral Prospecting & Exploration	1	0	3	2
AGY 803	Advanced Structural Geology	2	0	3	3
AGY 805	Remote Sensing in Applied Geology	1	0	3	2
AGY 807	Geochemical Exploration I	2	0	3	3
AGY 811	Advanced Petrology	2	0	3	3
AGY 829	Ore Mineralogy	2	0	3	3
AGP 815	Advanced Electromagnetic Methods	2	0	3	3
	Total				19

2ND Semester

Course Code	Course Title	L	T	P	U
AGY 804	Data Analyses in Geology	1	0	3	2
AGY 806	Industrial Minerals	1	0	3	2
AGY 808	Mining Geology	1	0	3	2
AGY 812	Geochemical Exploration II	2	0	3	3
AGY14	PG Seminar in Applied Geology	0	0	6	2
AGY816	Ore Deposits	2	0	3	3
AGY844	Advanced Geological Mapping	0	0	18	6
AGP824	Gravimetric and Magnetic Methods	2	0	3	3
	Total				23

2ND Semester

Course Code	Course Title	L	T	P	U
AGY 804	Data Analyses in Geology	1	0	3	2
AGY 814	PG Seminar in Applied Geology	0	0	6	2
AGY 816	Ore Deposits	2	0	3	3
AGY 820	Sedimentary Depositional Systems	1	0	3	2
AGY 822	Geographic Information System	1	0	3	2
AGY 824	Digital Image Processing	1	0	3	2
AGY 826	Geology of Petroleum	2	0	3	3
AGY 828	Remote Sensing Applications	1	0	3	2
AGY 844	Advanced Geological Mapping	0	0	18	6
AGP 824	Gravimetric and Magnetic Methods	2	0	3	3
	Total				27

iii) M. Tech Applied Geology (Remote Sensing Option)

1ST Semester

Course Code	Course Title	L	T	P	U
AGY 803	Advanced Structural Geology	2	0	3	3
AGY 805	Remote Sensing in Applied Geology	1	0	3	2
AGY 809	Non-Optical Systems	1	0	3	2
AGY 811	Advanced Petrology	2	0	3	3
AGY 815	Sedimentary Petrology	2	0	3	3
AGY 821	Groundwater Hydrology	2	0	3	3
AGY 823	Optical Systems	2	0	3	3
	Total				19

(iv) M. Tech Applied Geology (Hydrogeology & Engineering Geology Option)

1ST Semester

Course Code	Course Title	L	T	P	U
AGY803	Advanced Structural Geology	2	0	3	3
AGY805	Remote Sensing In Applied Geology	1	0	3	2
AGY811	Advanced Petrology	2	0	3	3
AGY821	Groundwater Hydrology	2	0	3	3
AGY825	Advanced Engineering Geology	2	0	3	3
AGY827	Soil Mechanics	1	0	3	2
AGP815	Advanced Electromagnetic Method	2	0	3	3
	Total				19

2ND Semester

Course Code	Course Title	L	T	P	U
AGY 804	Data Analyses in Geology	1	0	3	2
AGY 814	PG Seminar in Applied Geology	0	0	6	2
AGY 830	Environmental Hydrogeology	2	0	3	3
AGY 832	Foundation Systems	2	0	0	2
AGY 834	Rock Mechanics	1	0	3	2
AGY 836	Quantitative Hydrogeology	1	0	3	2
AGY 844	Advanced Geological Mapping	0	0	18	6
AGP 824	Gravity & Magnetic Methods	2	0	3	3
Total					22

2ND Semester

Course Code	Course Title	L	T	P	U
AGY 804	Data Analyses in Geology	1	0	3	2
AGY 814	PG Seminar in Applied Geology	0	0	6	2
AGY 818	Subsurface & Reservoir Geology	2	0	3	3
AGY 820	Sedimentary Depositional Systems	1	0	3	2
AGY 826	Geology of Petroleum	2	0	3	3
AGY 838	Clay Mineralogy	1	0	3	2
AGY 840	Palynology	1	0	3	2
AGY 844	Advanced Geological Mapping	0	0	18	6
AGP 822	Seismic Prospecting Methods	2	0	3	3
AGP 824	Geophysical Borehole Logging	2	0	3	3
Total					18

3RD SEMESTER FOR ALL THE OPTIONS

Course Code	Course Title	L	T	P	U
AGY 899	Thesis Research	0	0	36	12
Total		0	0	36	12

C. Doctor of Philosophy

Every Semester

Course Code	Course Title	L	T	P	U
AGY 999	PhD Thesis Research	0	0	0	12
Total					12

COURSE SYNOPSIS

a. Postgraduate Diploma

AGY 701 Crystallography & Mineralogy (2 units)

Formation of a crystal: principles of crystal chemistry, crystal state, crystal structure, crystallographic notations, crystal lattice and unit cell. Elements of symmetry, crystal systems, twinning, systematic of mineralogy, silicate structures. Characteristic properties and propagation of light. The polarizing microscope. Origin, identification, classification and distribution of minerals. Systematic description and occurrence of common rock-forming minerals. Association of minerals in rocks. Principles of optical mineralogy. Identification of common rock-forming minerals in parallel and convergent light under the polarizing microscope. Introduction to x-ray crystallography.

AGY 702 Geochemistry (2 units)

Classification and distribution of elements in the cosmic system, lithosphere, hydrosphere and atmosphere. Principles of major and trace elements analysis, preparation and analytical procedures. Field operations: sample collection and processing; map preparation and interpretation. Case histories. Computer applications.

AGY 703: Igneous and Metamorphic Petrology (2 units)

Origin, occurrence, geological setting and systematic description of igneous rocks; extrusive and intrusive igneous processes. Magmatic crystallization and phase equilibria; the genesis of selected igneous rocks. Granite rocks: classification and petrogenesis. Older and Younger Granites of Nigeria, charnockites, kimberlites, serpentinite and carbonatite. Metamorphism: agents and types. Description of metamorphic rocks. Metamorphic facies and facies series. Metamorphic minerals and textures of metamorphic rocks. Evolution of gneisses and migmatites; anatexis, metasomatism and granitisation. Orogeny, carbonatite problem; eclogites.

AGY 704: Structural Geology & Global Tectonics (2 units)

Stress and strain analyses in rocks. Deformation behaviour of rock materials: failure; fold and fracturing; use of Mohr Circle. Shear zones, salt domes and diapirism. Crystal defects, dislocation and recrystallization. Deformation mechanisms and development of textures. Stereographic projections. Fundamentals of plate tectonics; applications of plate tectonics in crustal evolution and mineral exploration. Analysis of large-scale regional structures.

AGY 705: Sedimentology & Stratigraphy (2 units)

Origin of different kinds of sedimentary rocks. Agents of sedimentation: physical, biological and chemical processes. Diagenesis; fundamental properties of sedimentary rocks. Environment of deposition. Concepts of chronostratigraphy,

lithostratigraphy, biostratigraphy, magnetostratigraphy and stratotypes. Principles of stratigraphic classification and terminologies; correlation; evolution of sedimentary basins. Facies analysis.

AGY 706: Paleontology (2 units)

Fossils and fossilization. Morphology, evolution, identification and stratigraphic significance of major animal phyla, viz.: - protozoa, porifera, coelenterata, brachiopoda, mollusca, arthropoda, echinodermata, graptolithina, foraminifera, ostracoda and conodonts, plants (pores and pollens) and trace fossils. Fossil records and geological time scale.

AGY 707: Geological Map Interpretation (2 units)

Elements of topographic maps. Detailed interpretation of topographic and geological maps- map preparation. Determination of geometric forms of outcrops. Recognition of geological structures on maps. Interpretation of subsurface data. Three-point problems.

AGY 708: Remote Sensing Techniques & Applications (2 units)

Concepts and foundations of remote sensing. Types of sensors. Aerial photography types. Principles of stereoscopic vision. Aerial photo interpretation. Non-photographic remote sensing systems. Acquisition of data, processing and enhancement. Interpreting techniques. Multi-spectral scanning systems. Surface thermal properties; interpretation of infra-red images. Imaging radar techniques. Case histories and applications.

AGY 709: Introduction to Geostatistics & Computing (2 units)

Elements of probability and probability distribution: normal, binomial, geometric, etc. Estimation and tests of hypothesis concerning parameters of distribution. Regression, correlation and analysis of variance. Multivariate data analysis. Broad introduction to computer, compiler, editor. Introduction to FORTRAN programming as a tool. Principles of structured programming. Introduction to various computer packages for 2-D & 3-D geostatistical data presentation.

AGY 710: Exploration Geophysics (2 units)

An introduction to geophysical prospecting methods-fundamental principles. Electrical properties of rocks and minerals. Self- and induced potentials; equipotential methods. Interpretation of data. Generation and propagation of seismic waves; travel time graphs for layered media; seismic velocity and its relationship to rock properties. Gravity and magnetic methods. Data collection and interpretation; Electromagnetic technique.

AGY 711: Hydrogeology (2 units)

Hydrological cycle. Hydrometeorology- rainfall, overland flow, interflow, etc. hydrographs. Occurrence and movement of groundwater. Hydrological properties of rocks. Aquifers and types. Springs. Physics of groundwater flow. Well hydraulics. Saline intrusions & coastal hydraulics. Groundwater exploration and exploitation techniques. Quality of groundwater. Environmental hydrogeology. Effects of groundwater on engineering construction materials. Hydrogeological maps.

AGY 712. Geology of Nigeria (2 units)

Major geomorphic and structural elements in Nigeria. The Basement Complex- origin, structure. Evolution of early to middle Proterozoic rocks in Nigeria. Evolution of Nigerian Schist Belts. Schist Belt mineralization. The Pan African orogeny and evolution of the associated granites. Younger Granites in the Jurassic geology of Nigeria. Rock dating techniques. Rb/Sr, K/Ar and U/Pb dating methods. Precambrian geochronology of Nigeria. Sedimentary basins in Nigeria. Intracratonic and peri-cratonic basins. Mineralization in the basins.

AGY 713: Engineering Geology (2 units)

Particulate nature of soils; index properties of soils and rocks. Strength characteristics and classification of soils and rocks. Clays and other soil types. Soils and rocks as construction materials. Site investigation- direct and indirect techniques. Engineering geological maps. Rock and soil slope stability. Methods of ground improvement. Seepage and erosion problems. Retaining walls, dams, highways and foundation types.

AGY 714: Geological Field Mapping (2 units)

A field-based course lasting three continuous weeks and involving techniques of gathering geological data from rock exposures, boreholes and pits. Measurement of geological parameters on sedimentary and crystalline rocks on the field. Field recognition of geological structures. Environmental conditions assessment.

AGY 715: Petroleum Geology (2 units)

The origin, migration and accumulation of hydrocarbons. Source rock characteristics and maturation scheme. Reservoir rocks and traps. Subsurface maps. Well logs, seismic data acquisition, processing and interpretation. Evaluation of petroleum potentials and reserves. Oil and Gas wells: drilling, completion and production. Global oil reserves. Oil deposits in Nigeria. Oil and geopolitics.

AGY 716: Seminar (1 unit)

Each student will present seminar on a special topic from any field of Applied Geology.

AGY 717: Economic Geology (2 units)

Processes of formation of mineral deposits, environments and localization of ore deposits. Wall-rock alteration; paragenesis and zoning in mineral deposits; textures and classification of ore deposits. Gemstones- crystal forms and habit. Physical properties of minerals and crystals. Synthetic and imitation stones. Fashioning of gemstones. Outline of methods used by diamond cutters and lapidaries. Metallogenesis. Methods of acquisition and exploitation of mineral deposits.

AGY 719: Exploration & Mining Geology (2 units)

Mode of occurrence and factors controlling ore deposition. Metallic and non-metallic mineral resources; fossil fuels. Exploration techniques: geological, geochemical, geophysical and remote sensing. Types of drilling and machinery. Roles of geologists in drilling and mining. Ore reserves estimation and classification. Mines and mining methods. Introduction to mineral rights and laws. Pollution study, prediction and control of geologic hazards.

AGY 799: PGD Research Project (6 units)

An independent research work in any area of Applied Geology will be assigned to each student as project at the beginning of Year Two. The student will present the project report for oral examination at the end of the session.

MASTER OF TECHNOLOGY (M.TECH)**AGY 801: Mineral Prospecting and Exploration (2 Units)**

History of mineral prospecting. Types of mineral deposits. Guides to mineralization and criteria for mineral prospecting. Prospecting methods. Applications of geophysical and geochemical methods in mineral exploration. Stages of exploration for mineral deposits. Drilling, logging and interpretation of drill-hole data. Methods of ore sampling in outcrops, open pits and underground mines. Definition and types of ore reserves. Ore reserve calculation. Exploration of alluvial deposits.

AGY 803: Advanced Structural Geology (2 Units)

Concepts of stress and strain. Finite strain determination in rocks. Cleavage, foliation and lineation development. Fold geometry, polyphase folding and fold interference patterns. Fault geometry. Thrust faults, balanced and restored cross sections. Brittle and ductile shear zones. Deformation mechanisms, recovery and recrystallization. Structural analyses; stereographic projection of structural data. Plate tectonics and major earth structures.

AGY 804: Data Analysis In Geology (2units)

Statistical analyses of geological data and graphical presentation techniques. Handling of vectors and matrices. Iteration techniques. FORTRAN Programming. Introduction to use of computer graphics packages (GRAPHER,

SURFER, SPSS, GEOGRAPHICS, WINFENCE, GWW e.t.c.)
in geological data presentation.

AGY 805: Remote Sensing in Geology (3Units)

Principles of geological interpretation of aerial photographs and their applications to geological mapping and mineral exploration. Satellite remote sensing. Sensors, principles and capabilities in analyses of imagery. Interpretation of geological features and structures from satellite imagery.

AGY 806: Industrial Minerals and Rocks (2 Units)

Geology of major industrial minerals and rocks. Review of the principal raw materials for construction, ceramics, glass, dimension stones, metallurgical, refractory, chemical and fertilizer industries etc. Methods of determination of their mineralogical, geotechnical and chemical properties.

AGY 807: Geochemical Exploration I (3 Units)

Introduction to the applications of geochemistry in mineral exploration Principles of geochemical dispersion and reconcentration in rock and ore systems. Primary dispersion patterns. Weathering, soil formation and the migration of economic and pathfinder elements in the secondary environment. Secondary dispersion patterns. Geochemical soil and drainage surveys. Biogeochemical, geobotanical and atmosgeochemical surveys

AGY 808: Mining Geology (2 Units)

Types of mines and mining methods. Stages in mine development. Mine mapping and mine exploration. Drilling, sampling and assaying of mineral deposits. Handling and transportation of ores. Mineral processing and beneficiation of ores. Mineral economics, metal prices. Mine safety, health and environmental protection. Geopolitics and mineral resource development. Nigerian mining laws.

AGY 809: Non-Optical Systems in Remote Sensing. (2 Units)

Thermal infrared Imagery. Thermal processes and properties of different materials. Infrared detection and imaging technology. Techniques of interpretation of infrared images. Radar imagery; the SLAR system image interpretation procedures. Radar imagery from satellites. Interferometric synthetic aperture radar (INSAR) imagery.

AGY 831: Advanced Igneous and Metamorphic Petrology(2 Units)

Origin and evolution of magmas; melting and crystallization models. Phase diagrams, petrological variation diagrams. Use of trace element in igneous petrogenesis. Isotopes in igneous petrology. Types and fields of metamorphism. Chemical equilibrium in metamorphism, the phase rule, metamorphic reactions, graphical representation of metamorphic parageneses. Metamorphic facies and facies series. Metamorphism and deformation. Geothermometry and

Geobarometry.

AGY 812 : Geochemical Exploration II (3 Units)

Geochemical affinity and geochemistry of important ore and pathfinder elements. Primary dispersion patterns around hydrothermal ore deposits, their enhancement and interpretation. Advanced geochemical prospecting techniques including applications to uranium prospecting. X-R-F and other methods of instrumental analyses. Advanced statistics and evaluation of geochemical data

AGY 813: Micropaleontology (2 Units)

Morphology, taxonomy, evolution, ecology and stratigraphic distribution of different groups of Foraminifera, Ostracods, and Calcareous Nannofossils (particularly Coccoliths, Discoasters, Radiolarian, Diatoms, Silicoflagellates, Conodonts and Pteropods). Ecological and paleoecological relationships of living and fossil microorganisms. Applications of micropaleontology to high resolution biostratigraphy. Paleobathymetry. Paleofacies analyses and paleoecology in oil exploration. Application of micropaleontology to other fields.

AGY 814: Postgraduate Seminar in Applied Geology (2 Units)

Literature review, write up and oral presentation of a topic on an aspect of applied geology in the area of specialization of the student

AGY 815: Sedimentary Petrology (3 Units)

Origin and classification of sedimentary particles Mineralogy of terrestrial sedimentary particles: quartz, feldspar, mica, heavy minerals and rock fragments. Bulk composition of sedimentary rocks: Grain morphometrics and grain size analyses of conglomerates and sandstones, and their relationship to provenance. Matrix of siliciclastic and carbonate rocks. Diagenesis in sandstones and limestones Composition of evaporites, chert, phosphate, iron-rich and manganese-rich rocks. Relationship of sandstone petrography to tectonics and sedimentation Field and laboratory methods of study of sedimentary rocks (texture, petrography etc)

AGY 816: Ore Deposits (3 Units)

Classification of ore deposits in relation to genesis and tectonic setting. Physical and chemical conditions of ore formation. Shape, mineralogy, genesis of magmatic, pegmatitic, carbonatite, hydrothermal and volcanoc-sedimentary ore deposits. Skarn and metamorphic ore deposits. Supergene and sedimentary ore deposits. Paragenesis and zoning. Wall rock alteration. Fluid inclusions and geothermometry. Metallic mineral deposits in Nigeria.

AGY 817: Energy Resources (2 Units)

Overview of conventional and non-conventional energy resources. Occurrence, exploration and exploration of the various sources of energy. World-wide distribution of energy resources.

Images, Arc GIS, Geomedia, etc).

AGY 818: Subsurface and Reservoir Geology (3 Units)

Concept of subsurface geology. Subsurface data acquisition. Drilling: cable and rotary drilling techniques. Well logs, mud logs, SP, Resistivity, Caliper, gamma ray, density and sonic logs (their petrophysical and reservoir characterization significance). Construction and Interpretation of subsurface maps, cross-sections and seismic stratigraphic data

AGY 823: Optical System (3 Units)

Aerial photography: characteristics and principles. Techniques of photogeological interpretation. Multispectral photography and imagery. Manned and unmanned satellite imagery (LANDSAT, SPOT etc). Techniques of imagery interpretation.

AGY 819: Basin Analysis and Sequence Stratigraphy (2 Units)

Physiography of sedimentary basins. Tectonic evolution of sedimentary basins, origin of basins through crustal sag, tension, compression and wrenching. Metallogeny and Petroleum Systems in sedimentary basins. Facies relationship and depositional sequences. Aspects of sequence stratigraphy: relationship between sequence boundaries and systems tracts. Evolution of sequence stratigraphic models: Nigerian basins as case studies.

AGY 824: Digital Image Processing (2Units)

Image structure and image processing systems. Image restoration and image enhancement. Information extraction strategy. Hardwares and softwares for image processing.

AGY 820: Sedimentary Depositional Systems (2 Units)

Techniques of environmental diagnosis; rock geometry, lithologies, rock textures, sedimentary structures, paleocurrent patterns, fossils, sequences and cycles. Study of facies relations in modern depositional environments of both carbonate and terrigenous sediments and applications to ancient sedimentary deposits. Environmental analyses of river, lake, delta, clastic shoreline, carbonate shoreline, shelf, flysch, turbidites and pelagic deposits.

AGY 825: Advanced Engineering Geology (3Units)

Advanced study of the application of geology to civil and mining engineering. Stress, strain and elasticity. Rocks and soils as construction materials and aggregates. Applications of soil parameters to structural designs in foundations. Soil stabilization methods. Engineering geological site investigations for highways, buildings, dams, bridges, surface and subsurface excavations. Engineering geological maps. Ground engineering. Geotextiles, geomembranes.

AGY 826: Geology of Petroleum (3 Units)

Petroleum System: significance of source, migration, reservoir, trap, pool in a petroleum play. Distinction between petroleum pool, field and province. Characteristics of a classic oil and gas province. Surface occurrences of Petroleum: oil exudates, bitumen and sand and oil shale. Occurrences of conventional petroleum. Origin of petroleum: composition and transformation of organic matter. Aspects of source rock petroleum geochemistry. Source rock maturation indices. Primary and secondary petroleum migration. Reservoir characteristics. Reservoir mechanics and energy; secondary recovery. The Niger Delta Oil Province.

AGY 827: Soil Mechanics (2 Units)

Soil identification and classification systems. Soil mineralogy and methods of its determination. Soil physics, specific gravity, bulk density, porosity, permeability and seepage in soils. Phase relationships in soil engineering. Shear strength of soils and its measurement, the concept of effective stresses. Theory of compaction and consolidation of soils, California Bearing Ratio (CBR). Roadside arboriculture. Soil exploration methods. Problems in soil engineering.

AGY 821: Groundwater Hydrology (3 Units)

Hydrologic cycle. Physics of flow through porous media. Equation of continuity. Aquifer characteristics and influence of geological factors. Methods of sinking wells, pumping tests, analyses of borehole data. Saline water intrusions and coastal hydraulics. Groundwater resource systems. Groundwater resources and basins of Nigeria. Hydrogeological mapping and its applications.

AGY 828: Remote Sensing Applications (2 Units)

Applications of remote sensing techniques to the exploration of natural resources – oil, solid minerals, geothermal and

Ag 822: Geographic Information Systems (2 Units)

Types of data for a Geographic Information System (GIS): Field geological, borehole, resistivity, seismic, gravity, geochemical, engineering geological, hydrological etc. data formatting on a common co-ordinate system (data planes), vector format, grid format, raster format. Map-oriented and image-oriented GIS. Synergistic interpretation: mineral exploration (correlation of geological and geophysical anomalies), natural hazards (soil erosion earthquakes, floods, landslides etc). Introduction to GIS software (ILWIS, Erdas

other energy sources; environmental and landuse monitoring – natural hazards: earthquakes, floods, volcanoes, land subsidence and landslides, subsurface coal fires, e.t.c. use of interferometric synthetic aperture radar in hazard monitoring.

AGY 829: Ore Mineralogy (3 Units)

Review of ore mineral types and classes. Methods of identifying ore minerals in hand specimens and their main diagnostic features. Utilization of the reflected light (ore) microscope. Physical and optical properties of ore minerals. Textures and structures of ore minerals. Ore mineral paragenesis.

AGY 830: Environmental Hydrogeology (3 Units)

Distribution of elements and isotopes in groundwater, chemical equilibria in groundwater. Chemical classification and chemical facies of groundwater. Equilibrium constants of water-rock interactions, water-oil interactions. Chemical and biological pollution indices. Theory of groundwater flow and transport systems-flow nets in crystalline and sedimentary rocks. Transport and fate of chemical and biological particles in groundwater.

AGY 832: Foundation Systems (2 Units)

Detailed study of methods of subsurface investigations in soils and rocks for foundation construction. Hydraulic properties of soils and rocks, consolidation characteristics of soils. The different types of foundations for superstructures on rocks and soils. Methods of construction of strip, raft, pile and buoyancy foundations. Buoyancy shafts, retaining walls and abutments. Drainage and stabilization during and after construction. Selection of foundation types: basis for design of foundations and retaining structures. Qualities of a good foundation. Foundation materials. Foundation settlement.

AGY 834: Rock Mechanics (2 Units)

Geological and engineering classification of rocks for construction purposes. Determination of the physical properties and strength parameters of rocks. Failure criteria in rocks. Plastic flow, dislocation, structural and strength anisotropy, porosity and degree of saturation. Stress energy concept. Concepts of shear and tri-axial strengths in discontinuous rock media. Various methods of stability analysis for rock slopes and underground excavations. Methods of laboratory testing of mechanical properties of rocks. Practical applications of the principles of rock mechanics.

AGY 836: Quantitative Hydrogeology (2 Units)

Groundwater flow and transport equations: advection, dispersion and boundary flow equations. Computer and mathematical simulation of groundwater systems. Solution techniques – finite difference and finite element methods. Iteration techniques. Programming of the model equations. Introduction to the use of computer modeling packages e.g. MODFLOW.

AGY 838: Clay Mineralogy (2 Units)

Types of clay minerals. Clay mineral structures and their classification: two layer and three-layer types; kaolinite group, smectite (montmorillonite) group, illite group, chlorite group. Properties in relation to structure. Formation of clay minerals. Methods of clay analysis: X-ray diffractometry, flame diffraction analysis, electron microscopy. Clay diagenesis in relation to petroleum genesis and exploration.

AGY 840: Palynology (3 Units)

Definition of palynology and some palynological terms. Morphology: exine of pollen and spores. Systematics in palynology. Deposition and preservation of palynomorphs in sedimentary environments. Sample reliability in palynological analysis. Dinoflagellate cysts, acritarchs, tasmanitids and other organisms associated with palynological periods especially the Cretaceous, Tertiary and Quartenary. Palynofacies analysis. Palynology and thermal maturation studies.

AGY 844: Advanced Geological Mapping (6 Units)

Detailed geological mapping of a selected area and submission of a report on it. The work carried out in this course shall be distinct from the Research Project.

AGY 899: Master's Thesis Research Project (12 Units)

Independent geological research project the results of which are presented in the form of a thesis.

C. Doctor of Philosophy

AGY 999: PhD Thesis Research Project in Applied Geology (12 units)

Original research project, which must involve independent geological investigations using state-of-the-art technology in any of the listed fields, should make new and significant contributions to the understanding and knowledge of Applied Geology. The report should be presented in form of a thesis using approved format. Every candidate must present, at least, two successful seminars before submission of PhD thesis report for examination.

ACADEMIC STAFF LIST

S/N	NAMES	QUALIFICATIONS	STATUS	AREA(S) OF SPECIALIZATION
1.	Dr. S. A. Opeloye	BSc, MSc (Ibadan); PhD (Bauchi) NMGS, COMEG-reg	Reader /Ag. HOD	Petroleum Geology, Sedimentology
2.	Prof. I.B. Odeyemi	BSc, PhD(Ibadan); PGD (Trieste) MNMGS, MGSA, MTNARS, MNISORS, COMEG-reg	Professor	Petrology, Structural Geology, Remote Sensing
3.	Prof. Y.A. Asiwaju-Bello	BSc, MSc(Ife); PhD(Leeds) FNMGS, MNAH, COMEG-reg	Professor	Hydrogeology; Engineering Geology
4.	Prof. V. O. Olarewaju	BSc(Ibadan); MSc(Zaria); PhD (London) NMNGS, COMEG-reg	Visiting Professor	Mineral Exploration, Geochemistry.
5.	Prof.S. Malomo	BSc(Ibadan); MSc, PhD (Leeds) NMGS, COMEG-reg	Adjunct Professor	Engineering Geology, Geotechnics, Hydrogeology
6.	Dr. C.T. Okonkwo	BSc, MSc(Ibadan);PhD(Keele) FNMGs, COMEG-reg	Reader	Petrology, Structural Geology
7.	Dr. O.A. Ojo	BSc(Manitoba); MSc,PhD(Ife) NMGS, COMEG-reg	Visiting Reader	Petroleum Geology, Palynology, Biostratigraphy
8.	Dr. A.T. Bolarinwa	BSc(Ilorin); MSc, PhD(Ibadan) NMGS, COMEG-reg	Visiting Senior Lecturer	Mineral Exploration, Geochemistry
9.	Dr. P.S. Ola	BSc, MSc(Benin); PhD(Akure) NMGS, COMEG-reg	Senior Lecturer	Petroleum Geology, Sedimentology
10.	Dr. O. A. Ademeso	BSc, MSc(Ibadan); PhD(Akure) NMGS, COMEG-reg	Senior Lecturer	Mineral Exploration, Rock Mechanics (Engineering Geology)
11	Dr. O.S. Ayodele	BSc (Ekiti),M.Tech (Akure), PhD (Ago Iwoye) NMGS, COMEG-reg	Senior Lecturer	Mineral Exploration, Remote sensing

1.PROGRAMMES OFFERED

- (a) Postgraduate Diploma (PGD)
- (b) Masters of Technology (M.Tech)
- (c) Doctor of Philosophy (Ph.D)

2. AVAILABLE OPTIONS / SPECIALIZATION

- (a) Postgraduate Diploma (PGD)
 - Meteorology and Climate Science
- (b) M.Tech with specialization in
 - (i) Climate Dynamics
 - (ii) Environmental Meteorology
 - (iii) Agricultural Meteorology & Water Resources System
 - (iv) Aviation and synoptic Meteorology
- (c) Ph.D with specialization in
 - (i) Climate Dynamics
 - (ii) Environmental Meteorology
 - (iii) Agricultural Meteorology & Water Resources Systems
 - (iv) Aviation and synoptic Meteorology

3. PHILOSOPHY AND OBJECTIVES

- (a) Postgraduate Diploma (PGD)

The major objectives of the programme are:

- (i) To enhance the employment opportunities of graduates from other fields, in an economy increasingly faced with the challenges of solving problems posed by the impact of industrial activities and weather on the environment.
- (ii) To prepare graduates from other fields who may wish to pursue graduate studies in Meteorology up to the Masters and PhD level
- (iii) To enhance self-employability of graduates from the basic sciences by empowering them with skills needed for applied services in agriculture, water resource management, climate change impacts, atmospheric pollution, and alternative energy (wind, solar, etc.) exploitation, building climatology, coastal engineering and transport meteorology.
- (iv) To provide further technological expertise to workers in Federal, State and Local Government agencies such as the Environmental Protection Agency (EPA), Waste Management Boards, Agricultural Development Projects (ADP) and Agencies and Oil and gas producing companies.

(b) M.Tech/Ph.D Programmes

The philosophy of the programme is to train students to become practicing meteorologists and scientists for the research and services sectors of the economy. The objective of the programme is to produce professional personnel equipped with the research and technological skills required to face current and future challenges and be able to provide solutions to atmospheric, agricultural, environmental and other socio-economic problems occasioned by the interplay of weather, climate and anthropogenic factors.

5. ADMISSION REQUIREMENTS**a). Postgraduate Diploma**

- (i) B.Sc./B.Tech. with at least a third class in any of the following: Geography, Urban and Regional Planning, Agricultural, Biological and Chemical Sciences,
- (ii) B.Sc/B.Tech. with at least a Third Class or HND with Lower Credit in Meteorology or any of the Physical Sciences, and
- (iii) Other equivalent qualifications recognized by Senate.

b). M. Tech

In addition to the University's general admission regulations and guidelines, first degree graduates of FUTA or any other recognized university with a minimum of second class division (Lower Div.) in the following disciplines are considered:

- i) Meteorology,
- ii) Physical Sciences and Engineering,
- iii) Mathematics. and
- iv) Computer Science

Candidates with a minimum of upper credit at the PGD level in meteorology are also eligible.

c). Ph. D

Candidates with Masters degree in Meteorology, Physics, Mathematics or Computer Sciences, normally with Ph.D grade may be admitted into the Ph. D programme. In addition, holders of Masters Degree from other institutions may be required to audit and pass some courses that may be prescribed by the department.

6. DURATION OF PROGRAMME:**a). Postgraduate Diploma**

The programme, which will normally be on part-time (weekends only), will cover a period of three semesters.

b). M. Tech

Full Time: 18 months. Senate may approve an extension where necessary

c). Ph.D

Full Time: 36 months; Part Time: 48 months. Senate may approve an extension where necessary

7. REQUIREMENTS FOR GRADUATION**a) Post-Graduate Diploma**

Each diploma student will be required to complete and pass successfully a minimum of 43 credit units, which must include 6 units of supervised project.

b) M. Tech

Each student will be required to complete and pass a minimum of 57 credit units which must include 12 units of supervised project.

(c) Ph.D

All candidates are expected to carry out original research project supervised by approved post-graduate Lecturers and successfully defend same in accordance with the postgraduate school regulations.

2ND SEMESTER

Course Code	Course Title	L	T	P	U
MET 702	Atmospheric Dynamics	3	0	0	3
MET 704	Urban And Air Pollution Meteorology	2	0	0	2
MET 706	Introduction to Remote Sensing And Satellite Meteorology	3	0	0	3
MET 708	Air-Sea Interaction And Climate Change	2	0	0	2
MET 710	Marine Meteorology & Oceanography	2	0	0	2
Total					12

8. OUTLINE FOR EACH PROGRAMME**A). POST-GRADUATE DIPLOMA****1ST SEMESTER**

Course Code	Course Title	L	T	P	U
MET701	Introduction to Atmospheric Science and Radiation	3	0	0	3
MET703	Introduction to Boundary Layer Meteorology	3	0	0	3
MET705	Instrumentation and Environmental Measurements	0	0	6	2
MET707	Tropical Weather Systems	2	0	0	2
MET709	Meteorological Observations and Practice	0	0	6	2
MET711	Mathematical & Statistical Methods in Meteorology	2	0	3	3
Total					15

3RD SEMESTER

Course Code	Course Title	L	T	P	U
MET 799	PGD Research Project	0	0	0	6

b). M. TECH**1ST Semester: Compulsory Courses**

Course Code	Course Title	L	T	P	U
MET 801	Pure and Applied Meteorology	3	0	0	3
MET 803	Meteorological Analysis	0	0	6	3
MET 807	Advanced Tropical Meteorology	3	0	0	3
MET 811	Statistical & Numerical Methods in Meteorology	2	0	3	3
MET 817	Air/Sea Interactions	2	0	0	2
MET 805	Dynamics of the atmosphere and Climate change	2	0	3	3
Electives					
		6	0	0	6
					20

Electives: (Students will be guided in selecting elective courses, depending on the degree option chosen.)

Course Code	Course Title	L	T	P	U
MET 809	Upper Air Meteorology	3	0	0	3
MET 813	Water Resources System	3	0	0	3
MET 815	Urban Meteorology and Climatology	3	0	0	3
EEE 821	Instrumentation in Engineering	3	0	0	3
CSP 803	Agro-Climatology and Plant physiology	3	0	0	3
URP807	Environmental Engineering	3	0	0	3
URP 827	Environmental Impact Assessment	3	0	0	3

Electives: (Students will be guided in selecting elective courses, depending on the degree option chosen.)

Course Code	Course Title	L	T	P	U
MET 806	Atmospheric Models	2	0	3	3
MET 810	Advanced Agricultural Meteorology	2	0	3	3
MET 814	Environmental Pollution and Control	2	0	3	3
MET 816	Meso-scale Meteorology	3	0	0	3
PHY 806	Measurement Laboratory & Experiment Techniques	1	0	6	3
	TOTAL				15

C. Ph.D

2ND Semester: Compulsory Courses

Course Code	Course Title	L	T	P	U
MET 802	Lower Atmospheric Processes	2	0	3	3
MET 804	Physical and Dynamical oceanography	3	0	0	3
MET 808	Advanced Radar and Satellite Meteorology	2	0	3	3
MET 812	Advanced Instrumentation and Environmental Measurements	1	0	6	3
MET 818	Remote Sensing & GIS Applications in Meteorology	2	0	3	3
MET 800	Seminar	0	0	6	2
MET 820	Field work	0	0	6	2
	Electives				6
	Total				23

9. COURSE SYNOPSIS

A). POST-GRADUATE DIPLOMA

MET 701: Introduction to Atmospheric Science and Radiation (3 Units)

Detailed treatment of atmospheric variables (pressure, temperature, etc); their variations in time and space. Moisture variables – mixing ratio, specific humidity etc. Pressure systems. Lapse rates – environment, dry and wet adiabatic lapse rates; the effect of latent heat release. Types and characteristics of atmospheric stability. Relationship between lapse rates, stability and clouds. Types of clouds and their classification. Types of precipitation associated with clouds. Scales of motion in atmosphere. Pressure gradient and Coriolis forces. Atmospheric motion: geostrophic, gradient and thermal wind. Divergence and vorticity. Air masses and source regions. Air masses affecting tropical and temperate regions. ITCZ and ITD. The polar front and fronted slopes. Life cycles of frontal depressions. Frontal cross-sections.

The solar system: Gravitation; the planets; the moons, comets and meteors. The sun: solar atmosphere; activity regions: sunspots, solar flares, solar wind, solar radiation and the Earth's atmosphere. Absorption , scattering and transmission of radiation. Attenuation of radiation under cloudy and cloudless condition.

MET 702 : Atmospheric Dynamics (3 Units)

The physical laws governing atmospheric motion. Law of thermodynamics. Phase changes. Clausius-Claperyon equations. Thermodynamics of moist and dry processes. Derivation of expressions for the adiabatic lapse rates. Parcel tracers; potential temperature, equivalent and wet-bulb potential temperature etc. types of atmospheres. Atmospheric statics: stability criterion for both dry and moist ascent. Thermodynamic diagrams and their uses. Practical exercises with the T-Ø gram; determination of updraft velocities and precipitation rates. Forces acting on a fluid element. Equations of motion of a non-inertia (rotating) frame of reference. Effect of the shape of the earth on the equations. Scale analysis of the full equations leading to the hydrostatic, geostrophic approximations. The continuity equation. The thermal wind equations-Barotropic and Baroclinic atmospheres. Thermal wind and jet streams. Thermal wind and advection. Circulation and vorticity. Application to land and sea breezes. Divergence and convergence. Derivations and discussion of the vorticity equation; middle latitude and tropical cases.

MET 703: Introduction To Boundary Layer Meteorology (3 Units)

Simplifications used in describing the boundary layer. Constant and variable eddy viscosity. Wind profile near the surface; Ekman spiral. Log and power laws for neutral stability. Roughness length. Stability parameters: Richardson's number (R_i), and its fluxes form; Monin-Obukhov parameter, Z/L , and its relation to R_i . Dispersion of pollutants in boundary layer (e.g. smoke, dust). Specification of turbulent fields: velocity correlation and cross-correlations (with temperature and moisture). Turbulent energy equation. Eddy transfer coefficients. Turbulent transports of heat, moisture and momentum. Flux profiles. Bowen ratio and Penman's formula for heat and evaporation estimates. Importance of eddy transports especially for agriculture and to tropical weather systems.

MET 704: Urban And Air Pollution Meteorology (2 Units)

Atmospheric pollution and types; green house gases, ozone depletion and health hazard; effect on ecosystems. The hypsometric equation, lapse rates. Atmospheric stability, potential temperature, potential density. Introduction to microscale and mesoscale meteorology, Brunt-Vaisala frequency. Graphical representation of atmospheric data. Types of Pollutants (Active and Passive). Atmospheric chemical reactions. Dispersion and plume rise, source strength, characteristic plume shapes, removal mechanisms, terrain effects, dispersion models. Estimation of local diffusion and air pollution from meteorological data. Meteorological

factors affecting diffusion, dispersion, industrial stacks. Effects of atmospheric stability on pollutant dispersion and transport. Local Climate (Land and sea Breeze). Building Climatology. The heat island. Wind structures in urban areas. Humidity fields. Urban flood control and Management. Models of urban temperature and wind fields. Human biometeorology. Climate and urban planning. Weather forecasting for urban areas. Weather modification.

MET 705 :Instrumentation And Environmental Measurement (2 Units)

Fundamental principle of meteorological instrumentation. Basic requirements; sensitivity, errors, durability, ease of use, maintenance. Exposure problems. Spot and continuous measurements: General instrumentation to monitor precipitation, winds, evaporation, solar radiation, temperature, pressure, clouds, visibility and sea salinity. Upper air: radiosonde and radio-theodolite techniques. Use of radar and satellites: Infrared measurement and imagery. Instrumentation in micrometeorology: Soil temperature, moisture and heat flux. Leaf area index, leaf/canopy resistance, solar radiation, eddies. Pollen disposal. Hydrological measurement water current, water table. Observation system: Automatic stations, marine, aircraft and satellite observations Instrumentation in Air Pollution measurement

MET 706: Introduction to Remote Sensing and Satellite Meteorology (3 Units)

Electromagnetic radiation principles. Remote sensing of the earth surface utilizing the electromagnetic spectrum. History of aerial photography and aerial photography. Vantage point. Cameras, Filters and films. Element of visual interpretation. Photogrammetry. Microwave imagery from Airplane. Satellite and manned spacecraft platform. Remote sensing systems: multi-spectral, thermal infra red, active and passive microwave, optical sensors, RADAR and LIDAR. Remote sensing applications for meteorological parameters, vegetation (NDVI, ENVI, etc), water systems, urban landscape, soils, minerals and Geomorphology, SST and wind (e.g. QuickSCAT). Satellite orbits, types of satellites, visible and infrared imagery. Surface temperature measurements; upper air temperature and moisture soundings; determination of upper winds. Problems of interpretation of data and assignment of levels to wind measurements; effects of local influences (e.g. mountains). Uses of satellite information in weather forecasting, soil moisture monitoring, dust haze occurrence and movement, drought occurrence.

MET 707: Tropical Weather Systems (2 units)

The mean state of the tropical atmosphere (temp, pressure, RH and winds structure). Winter and summer situations. Major motion systems: ITD, ITCZ (in detail), monsoons, TEJ and AEJ: their climatology, causes and importance for tropical weather systems, Instability of tropical flows; structure and dynamics of easterly waves and vortices.

Upper level flows. The westerly jet in winter. Hurricanes and Typhoons, their large- and meso- environments; Quasi-Benieral Oscillatio (QBO), its causes and uses. Precipitation distribution in time and space; influence of AEJ and TEJ. Climate change and precipitation. Forecasting methods: empirical,statistica/empirical, dynamic/empirical, numerical and difficulties in the tropics. Usefulness of Global efforts and experiments for the tropics, e.g. CLIVAR-Africa, AMMA etc.

MET 708: Air – Sea Interaction and Climate Change (2 Units)

Basic observations of the coupled ocean-atmosphere system: Mean conditions at the air-sea interface, seasonal cycles, intraseasonal and interannual variability. Understanding the atmospheric response to sea surface temperature anomalies; clouds; convective boundary layer. Interactions between the tropical Ocean and Atmosphere. Climate science; solar and terrestrial radiation. Energy balance. heat fluxes (sensible, latent and ground heat fluxes). Anthropogenic changes; Climate forcing agents. Ozone depletion: causes and effects. Climate change detection and attribution. ENSO. Global warming and climate variability and change. West African monsoon and precipitation: impact of desertification and deforestation; albedo effects. Future climate; Future emissions and climate change. Future climate predictions.

MET 709 Meteorological Observations and Practice (2 units)

Basic meteorological variables and methods of observation. Briefs descriptions of the instruments for measurement of both surface and upper air information. WMO Codes for surface and upper air data (Synoptic and Temperature Codes including AIREP messages). Actual observations and coding practice. Plotting Practice: surface and upper air Charts. Introduction to divergence and vorticity. Types of analysis (isobaric, streamline, isallobaric etc.) and their uses and limitations. Applications to middle latitudes and tropics. Actual scalar analysis of meteorological parameters (temperature, wind components etc.) Isobaric and streamline analysis – sequences of simple surface and upper air charts for middle and low latitudes illustrating different synoptic situations. Preparation of briefs for air-pilots, mariners and other users. Links with the Central Forecast Office and International Offices. Organization and management of weather stations, offices and research posts

MET 710: Marine Meteorology and Oceanography (2 units)

The major ocean currents; characteristics, similarities and connection with atmospheric general circulation. Under-water topography and effects on upwelling and sea surface temperatures and hence climate, with special reference to the Gulf Stream, El Nino and the Gulf of Guinea currents etc. sea fogs. Definition of water masses by temperature and salinity. Oceanic gyres, eddies and fronts; comparison with synoptic meteorology; cross-sections across oceanic fronts. Stratification in the Oceans: the creation, growth and decay of transient and seasonal thermoclines; Tracer (dye) studies of

thermoclines, internal waves on thermoclines. Upwelling and thermocline effects on fisheries.

MET 711: Mathematical and Statistical Methods in Meteorology (3 Units)

Functions of Real Variables. Differential and Integration Calculus and their applications. Error analysis, Interpolation and approximations. Vector analysis : Dot and Vector product, Curl Divergence of Vector fields. Matrices and its application in solving Meteorological problems. Decomposition of Meteorological parameters into Mean and turbulent parts. Introduction to tensor analysis. Location and Dispersion measurement in a sample and grouped data (Mean, Mode, Median, Standard Deviation etc); Regression (Linear and Multiple) and Correlation, their use in prediction of Meteorological variables. Analysis of Variables (ANOVA) and Covariance. Test of hypothesis. Normal and Binomial Distribution.

MET 713: Seminar (2 units)

A term paper on a chosen topic on application of meteorology to solve an industrial or societal problem will be presented by each student.

MET 715: Agricultural Meteorology (3 Units)

Weather observations for Agriculture, the Meteorological variables: winds, precipitation, evaporation, evapotranspiration (potential and actual) temperature, winds and humidity extremes. Suggestion of suitable regions for crop production. Local variations and crop/animal production. Investigation of atmospheric conditions within a crop. Electrical analogues. Farming systems: Cultural practices including land preparation timing and technique as functions of the climate. Causes and effects of soil erosion. Crop-weather modelling for yields and growths. Climate and seasonal forecasting for agriculture: onset, cessation, length of rainy season and length of growing season, selection of crop/seed type; Effect of climate variability & change on agricultural practice and production; irrigation, mulching, frost protection, wind breaks, etc.

MET 717: Hydrometeorology (2 Units)

The hydrological cycle and major precipitation processes. Conversion of rainfall measured at a point to area estimate; topographic influence. Evaporation processes; Measurement and estimation of evaporation by Penman's method. Water balance; periods of surplus and deficit. Soil moisture infiltration, soil moisture storage and measurement of flow in natural channels and with structures. Factors affecting runoffs, storm run-off and the unit hydrograph. Effect of vegetation on water balance. River basin development in relation to river regimes. Droughts and its effect on ground water movement and table. Hyrometeorological practice; present techniques and trends in the tropics.

MET 799: PGD Research Project (6 Units)

Each student will be required to undertake an in-depth but supervised project in any area of interest applicable to meteorology.

B). M. TECH PROGRAMME

MET 801 :Pure And Applied Meteorology (3 units)

The atmosphere and profile of meteorological parameters. Pressure and temperature systems. Air masses. Fronts and Disturbance lines. Clouds and associated precipitation. the mean global circulations. Scales of atmospheric motion. Pressure gradient, and Coriolis forces. Geostrophic and thermal winds. Momentum and conservation equations. Global energy budget and fluxes; order of magnitudes. Thermodynamics laws, phase changes. Clausius-Claperyon equations. Lapse rates and stability in both dry and moist atmospheres. Potential equivalent and wet-bulb temperatures. Energy diagrams. General applications of meteorology in Transportation, Agriculture, Urban and Town Planning, Building Technology, Construction and Food Industries. Water Resources Systems, Environmental Pollution. Major weather hazards; turbulence, icing, fog, haze, storms, hurricanes and tornadoes. Regular PG paper presentation.

MET 802: Lower Atmospheric Processes (3 Units)

Description and evaluation of the boundary layer. Temperature, humidity and wind profiles and related fluxes of heat moisture, and momentum. Temporal and spatial variation of fluxes. Surface stress and measurements/estimates. Laminar and turbulent flow. Characteristics and description of turbulence. Micro-meteorological methods of determining surface mass, momentum, moisture and energy fluxes. Applications in pollution modeling and numerical weather prediction.

MET 803: Meteorological Analysis (3 units)

Basic variables of synoptic analysis. WMO codes. Observation, coding and plotting techniques. Chart Analysis. Deduction of likely developments using isallobaric, isobaric, Sutcliffe and Streamline techniques. Special problems in the tropics. Use of energy diagrams, satellite and radar information and teleprinters in forecasting. Importance of local experience such as topography and distance from oceans. Preparation of briefs for air-pilots, mariners and other users. Links with the Central Forecast Office and International Offices. Organisation and management of weather stations, offices and research posts.

MET 804: Physical and Dynamical Oceanography (3 Units)

Major ocean current. steady wind-driven circulation. Theoretical models . Non Linear effects in the boundary currents. Charneys inertia boundary layer. Models of unsteady wind driven ocean circulation. Dynamics of surface waves in the ocean, wave interactions. Dynamics of inertia wave

phenomena. Micro- scale structure and oceanic turbulence. General oceanic circulation. The El-Nino current, Climatology of coastal areas. Gyres and oceanic tides. Principal features of tidal phenomenon. Tides generating forces. Estimates of tidal current in the proximity of land. Analysis of storm surge phenomena. Air-sea interactions.

MET 805: Dynamics of the Atmosphere and Climate Change (3 Units)

Basic equations of motion. Mass conservation and thermodynamics. Primitive equations in z-coordinates, pressure coordinates and sigma coordinates. Useful approximations: Geostrophic balance, thermal wind, barotropic and Baroclinic flows. Circulation and Vorticity: Bjerkens theorem, Conservation of potential vorticity and the applications, Relative vorticity equation. Barotropic Vorticity Equation, Free Rossby waves. Quasi-geostrophy theory: Stationary Rossby waves, Baroclinic instability: Two-level (Philips) model. Dynamics of Tropical Atmosphere, Tropical Stationary waves, Kelvin waves. Understanding the atmospheric response to sea surface temperature anomalies; clouds; convection; boundary layer. Introduction to the Big bang theory. Paleoclimatology; Recent centuries and the last 100 Million years. Climate science; solar and terrestrial radiation. Energy balance. heat fluxes (sensible, latent and ground heat fluxes). the carbon cycle. Physical climate interactions. Chemistry, biogeochemistry and biosphere-climate interactions. natural modes and coupled systems. Anthropogenic changes; Climate forcing agents. aerosol forcing of climate. climate models and simulation of current climate. Climate change detection and attribution. Future climate; Future emissions. Future climate predictions. Effects of climate change. Study of Climate sensitivity using Simplified Climate models. Statistical Methods in Climate Research: Significance and Hypothesis; Vector Autoregressive Models; Power Spectrum, Climate Predictability

MET 806: Atmospheric Models (3Units)

General equation of atmospheric motions with scale analysis. Barotropic and baroclinic atmospheres. Concepts of atmospheric instability. Selection principle. Parameterisation of energy fluxes (radiation, moisture, momentum) in atmospheric models. Perturbation theory. Energetics of real atmosphere (available potential energy). Multi-level models. energy conversion and the general circulation.

Met 807: Advanced Tropical Meteorology (3 Units)

Structure and climatology of tropical systems, ITD, AEJ and meso-scale systems such as shearlines, thunderstorms, cloud clusters, typhoons and monsoons. Squall lines. Dynamics and energetics of the tropical systems. Structure and dynamics of easterly waves. Rainfall models. Land and sea breezes. Dust haze and fog. Upper level flows. Climate change/variability and Early Warning Systems.

MET 808: Advanced Radar And Satellite Meteorology (3 units)

Principles of radar, the radar equation. Radar equation of spherical particles - limits and resolution. Attenuation. Use of radar for precipitation measurements - rainfall amount and intensity over an area. Pulsed doppler radar; doppler spectrum and shift frequency. Measurement of turbulence, updraft velocities, size distribution and wind speed. Use of radar in cloud physics research, weather forecasting and mesoscale convective systems (MCS); Extent of convective clouds, growth and duration of convective clouds, growth and duration of convective clouds. Bright band. Cloud seeding tests. Radar observations of medium and large scale systems. Clear air echoes. Physical principles of earth satellite and their sensors, radiometers, limits of resolution, interpretation of Infra-red and visible images, inversion of CO₂ emission data. Interpretation of data. Effects of local influences. Uses of satellite information in weather forecasting, soil moisture monitoring, dust haze occurrence and movement, drought occurrence.

Met 809: Upper Air Meteorology (3 Units)

Atmospheric nomenclature. Basic and hydrostatic equations. Scale height. Energy budget and radiative transfer. Atmospheric chemistry and physics (photo dissociation; collision frequency). Tidal and wind oscillations. Gravity waves. Interaction with the lower atmosphere. Atmospheric electricity. Solar wind. Radiowave propagation. Quasi-biennial Oscillation (QBO). Pressure changes in the upper atmosphere. Jet streams, Polar front jet (PFJ), association of jet streams with active frontal systems in the mid-latitude, the significant of the position of the jet stream, relation of upper air features to surface weather patterns, climate change , food and crop production.

MET 810: Advanced Agricultural Meteorology (3 Units)

Agroclimatology, Agroecology zoning, Agrometeorology observation, Biotic (phenological) and abiotic (physical environmental) observations. General introduction to meteorology, Weather elements and observations, Instrumentation, associated errors and problems. Agricultural practices, Plant water relations photosynthesis. Respiration, Growth and development, Crop protection and distribution, Animal environmental requirements. Feed, nutrition and environmental management. Farming system and crop production, Evaporation and crop water use, crop weather and yield models, modification of microclimate, pest and disease management climate and strategic decision making in agriculture Assessment of climate change and its impact on agriculture, Forest fire and weather, drought and desertification. Growth equations Agrometeorological statistics and forecasting techniques. Field and laboratory experiments in agrometeorology. Phenological climatology. Daylight spectrum and crop performance. Soil and land-cover climates. Leaf and canopy resistance to flux parameters. Canopy architecture. Crop-atmosphere interactions. Gaseous toxicity and plant growth. Biomass and productivity. Disease and pathogen vectors, climate of orchards and forests.

MET 811: Statistical and Numerical Methods in Meteorology (3units)

Significance and Hypothesis Testing. Covariance matrices, quadratic forms, associated sampling distributions. Optimization of quadratic forms, Principal Component Analysis, North et al.'s "Rule of Thumb.". Canonical Correlation Analysis, Discriminant Analysis, associated sampling distributions. Vector Autoregressive Models, cross validation, power spectrum analysis, Predictability. Functions of Real Variables. Differential and Integration Calculus and their applications. Error analysis, Interpolation and approximations. Vector analysis : Dot and Vector product, Curl Divergence of Vector fields. Matrices and its application in solving Meteorological problems. Decomposition of Meteorological parameters into Mean and turbulent parts. Tensor analysis. Review of numerical methods relevant to Meteorological applications: Finite-differences and derivative expressions in terms of forwards, backward and centred differences; implicit and semi-implicit formulations. Solution of differential equations with given boundary conditions using the FORTRAN language. Time series analysis and filtering techniques.

MET 812: Advanced Instrumentation and Environmental Measurements (2Units)

Basic instrumentation in Meteorology. Techniques of laboratory and field research in atmospheric and environmental science (Air sampling devices. pollutant measurements). Routine and Research measurements. Calibration method for different instruments. Measurements and sources of errors. Data acquisition and analysis. Principles and operations of the following instruments. LIDAR (Light Detector and Range). RADAR (Radio Detector And Range). SODAR (Sound Detector and Range). Multi-filter radiometers. Pollutant measurements by DOAS systems.

MET 813: Water Resources Systems (3 Units)

Hydrological cycle. Precipitation estimates and measurements. Spatial and temporal variations. Groundwater and aquifer characteristics. Surface water measurements of flow in natural channels, base flow and regression curves; storms. Vegetation and water balance. Hydrological forecasting, water resources systems. Identification and evaluation of water management plans; models and solution procedures, simulation and search methods. Probability concepts. Time series and stochastic processes. Systems with dynamic uncertainty. Confidence interval for Quantiles and moments. River basin modelling; streamflow and reservoir estimation. Flood control alternatives. Hydroelectric power production. Models syntheses multiple site river basin planning models. Irrigation planning and operation models water quality prediction and simulation; steady-state models of river and estuarine systems. Reliability of receiving water quality simulation models. Non-point-source pollution models. Lake quality management.

MET 814: Environmental Pollution and Controls (3 units)

Meso-scale circulation. Sources of Air pollution , Effect of Air pollution. Atmospheric Systems and Pollutant Transport. Regulatory Control of Air Pollution. Atmospheric Systems and Pollutant Transport. Chemical kinetics and atmospheric pollution dispersions. Air pollution meteorology and controls. Pollutant dispersion models. Guassian Diffusion models: practical application and their limitations. Numerical Dispersion Models. Urban and Regional Air Quality models. Corrosion and deterioration. Photochemical smog formation and ozone production in the boundary layer. Global warming. Regulatory Control of Air Pollution. EPA Standards.

MET 815: Urban Meteorology and Climatology (3 units)

Local Climate (Land and sea Breeze). Building Climatology. The heat island. Flux parameters. Wind structures in urban areas. Humidity fields. Clouds and precipitation in urban areas. Urban flood control and Management. Models of urban temperature and wind fields. Human biometeorology. Climate and urban planning. weather forecasting for urban areas. Management of atmospheric resources. Climate modification. Econo-climate.

MET 816: Meso-Scale Meteorology (3 units)

Atmospheric scales of motion. Scaling analysis equations of motion applicable to meso-scale motions. Terrain-induced mesoscale systems and their dynamics: Seabreeze,Katabatic and anabatic flow, Coastal jet, Forest breeze. Tropical meso-scale systems: vortices, shearlines. Thunderstorms/squall lines, cloud clusters, Mesoscale convective systems, Hurricanes, typhoons. The CISK and other mechanisms: Divergence and vorticity in tropical meso-scale disturbances. Energy source for meso-scale disturbances. Rainfall production by meso-scale disturbances. Application of numerical modelling to mesoscale systems. Economic aspects of meso-scale systems.

MET 817: Air-Sea Interaction (2 Units)

Basic observations of the coupled ocean-atmosphere system: Mean conditions at the air-interface, seasonal cycle, intraseasonal variability, interannual variability. Equations of motion and valid approximations for the Ocean: Mixed layer theories (one dimensional); SST and surface fluxes; Shallow water model; Two layer model; Mid-latitude quasi-geostrophic approximation; Continuous stratification; Wind driven Ekman theory; equatorial undercurrent. Oceanic Waves (tropical and extra-tropical; Kelvin; coastal Kelvin; Rossby); beta dispersion; boundary reflections; equatorial adjustment; normal modes; response to remote forcing. Models of the Tropical Atmosphere: Hadley circulation; Gill model; Lindzen-Nigam model. Understanding the atmospheric response to sea surface temperature anomalies; clouds; convection; boundary layer. Interactions between the tropical Ocean and Atmosphere: Development of simple air-sea interaction model; Unstable interactions; Bjerknes-Wyrki mechanism; Unstable modes (unstable Kelvin and Rossby waves). Theories for ENSO; Predictability and prediction of ENSO.

MET 818: Remote Sensing And Gis Application In Meteorology (3 units)

Electromagnetic radiation principles. Remote sensing of the earth surface utilizing the electromagnetic spectrum. History of aerial photography and aerial photography. Vantage point. Cameras, Filters and films. Element of visual interpretation. Photogrammetry. Microwave imagery from Airplane. Satellite and manned spacecraft platform. Remote sensing systems: multi-spectral, thermal infra red, active and passive microwave, optical sensors, RADAR and LIDAR. Remote sensing applications for meteorological parameters, vegetation (NDVI, ENVI, etc), water systems, urban landscape, soils, minerals and Geomorphology, SST and wind (e.g. QuickSCAT). Analysis and applications of remotely-sensed ocean-color data and relevant software packages (BILKO and SEADAS). Introduction to Geographical information systems (GIS). GIS packages (IDRISI, Arcview etc) .GIS applications in urbanization, soil degradation, agricultural systems, land cover change, hydrology modeling and watersheding, human population distribution. Ground –truthing and pattern recognition. GIS applications in weather forecasting and TV presentation. Image interpretation, practical applications in earth science , and use of remotely sensed data in geographic information systems. Principles of image production and commercial offer, various spatial resolution available, image georeferencing techniques (GPS), image processing systems and techniques, methods for extracting useful thematic information (e.g. creation of a digital terrain model, land use image classification, multi-data studies)

MET 820 Term Paper

A term paper on a chosen topic on application of Meteorology to solve an industrial or societal problem will be presented by each student.

MET 899: Master's Thesis Research Project (12 Units)

A thesis on a subject related to any area of interest applicable to meteorology

C) Doctor of Philosophy

MET 999: Doctoral Research Project (12 Units)

Original research project, which must involve independent investigations in any of the listed fields, should make new and significant contributions to the understanding and knowledge of Meteorology. The report should be presented in form of a thesis using approved format. Every candidate must present, at least, two successful seminars before submission of PhD thesis report for examination.

10. STAFF LIST

S/N	STAFF	QUALIFICATIONS	DESIGNATION	AREA OF SPECIALIZATION
1	Ogunjobi K. O.	B.Sc. (Ilorin), M.Sc.(UNN), Ph.D (S.Korea), MNMetS,MNIP	Professor	Environmental Pollution, Climate variability & change, Atmospheric radiation
2	Omotosho J. A.	B.Sc.,Ph.D(Reading), Adv. Forecasting Cert., MNMetS, FRMets	Professor	Dynamic & Mesoscale systems; Forecasting Methods, Climate variability & change.
3	Adeyewa Z. D.	B.Sc., M.Sc., Ph.D (Ife), MNMetS, MNIP	Professor	Satellite meteorology & Atmospheric radiation, Climate variability & change
4	Balogun A. A.	B.Tech., M.Tech., Ph.D (Akure), MNMetS	Professor	Agricultural meteorology & Low-level processes, Climate variability & change
5	Okogbue E. C.	B.Sc., M.Sc., M.Phil., Ph.D (Ife), MNMetS, MSESN, MNIP	Professor	Climatology; Solar Radiation and Low-level processes, Climate variability & change
6	Ajayi V.O.	B.Tech., M.Tech., Ph.D (Akure), MNMetS	Senior Lecturer	Dynamic meteorology & Numerical Weather Prediction Climate variability & change
7	Balogun I.A.	B.Tech., M.Tech., Ph.D (Akure), MNMetS	Senior Lecturer	Urban Meteorology & hydrometeorology, Climate variability & change
8	Oluleye A.	B.Tech(Akure),, M.Tech. (Dundee), Ph.D (Akure), MNMetS	Senior Lecturer	Environmental Pollution, water vapour transport, Dynamic meteorology & Atmospheric fluid dynamics, Climate variability & change
9	Adefisan E. A.	B.Tech., M.Tech., Ph.D (Akure), MNMetS	Senior Lecturer	Dynamic meteorology & Numerical Weather Prediction, Climate variability & change
10	Akinbobola A.	B.Tech., M.Tech., Ph.D (Akure), MNMetS	Senior Lecturer	Biometeorology &Hydrometeorology, Climate variability & change

9.4 SCHOOL OF MANAGEMENT TECHNOLOGY (SMAT)

9.4.1 DEPARTMENT OF PROJECT (PMT)

1. PROGRAMME OFFERED

- (a) Postgraduate Diploma in Project Management Technology (PGD. PMT)
- (b) Master of Technology in Project Management Technology (M. Tech. PMT).
- (c) Ph.D (Project Management Technology)
- (d) Master of Technology (M. Tech) in Management Sciences
- (e) Doctor of Philosophy (Ph.D) in Management Sciences (Ph.D. MGS)

2. PGD PROGRAMME PHILOSOPHY

The Post-Graduate Diploma (PGD) programme in Project Management Technology is designed to meet the manpower requirements in the infrastructural and productive sectors. The programme aims to train graduates from a variety of background to become knowledgeable in project management and to qualify for professional or academic degree in Project Management Technology. The philosophy of the programme is therefore to train graduates to acquire technical and managerial knowledge for efficient and effective management of all aspects of projects and also to prepare them for a career in Project Management Technology in both public and private sectors.

3. PROGRAMME OBJECTIVES

The post-graduate diploma (PGD) programme in Project Management Technology is primarily designed to provide gap-bridging training in Project Management. The specific objectives of the programme are to:

- (a) expose post-graduate diploma students to both the theoretical and practical aspects of project management;
- (b) provide post-graduate diploma students with sufficient knowledge and skill to be self-employed and also take up competently management positions in the public and private sectors of the economy;
- (c) promote research in the management and improvement of the infrastructural and productive sectors of the Nigerian economy; and
- (d) provide a solid intellectual and methodological foundations for post-graduate diploma graduates to proceed to higher post-graduate studies.

PROGRAMME JUSTIFICATION

The Post-graduate Diploma Programme in Project Management Technology is a gap-bridging programme for non-professionals in the infrastructural and productive sectors, who are desirous of obtaining professional qualification in Project Management Technology. This is also

meant for sub-professionals and non-professionals who are currently working in various establishments, and are desirous of undergoing a professional training in Project Management Technology. The programme will boost the manpower requirements in the infrastructural and productive sectors and mitigate the problem of scarcity of professionals in the field. In addition it will prepare post-graduate diploma graduates for professional certification and academic advancement. These diplomates can be gainfully employed in road and building industry, communication, oil and gas industry, food processing and manufacturing industry, banking industry as well as international organizations.

5. ADMISSION REQUIREMENTS

Post-graduate Diploma Programme (PGD)

To be eligible for admission, candidates must possess any of the following qualifications:

- (a) B. Tech in Project Management Technology, B.Tech/B.Sc in Engineering, B. Tech/B.Sc. in Environmental Sciences or any other related discipline from a recognized University with a minimum of third class degree; or
- (b) Higher National Diploma (HND) with a minimum of lower credit or its equivalent in Engineering, Environmental Sciences, Agriculture and other related fields from a recognized polytechnic.

6. PROGRAMME DURATION

The programme shall be for three semesters full-time.

7. GRADUATION REQUIREMENTS

Candidates must complete a minimum of 45 course units to qualify for the award of

Postgraduate Diploma in Project Management Technology.

COURSE OUTLINES

FIRST SEMESTER, FIRST YEAR

Course Code	Course Title	L	T	P	U
PMT 701	Accounting for Managers	3	0	0	3
PMT 703	Quantitative Techniques	1	0	3	2
PMT 705	Principles of Marketing	2	0	0	2
PMT 707	Principles and Practice of Management	2	0	0	2
PMT 709	Financial Management for Managers	3	0	0	3
PMT 711	Principles of Insurance	2	0	0	2
PMT 713	Human Resource Management	2	0	0	2

PMT 715	Engineering Project Planning and Management	3	0	0	3
PMT 717	Applied Research Methods	3	0	0	3
	Total				22

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
PMT 702	Operations Research	3	0	0	3
PMT 704	Construction Technology and Materials	2	0	3	3
PMT 706	Computer Principles and Application	1	0	3	2
PMT 708	Project Performance Management	2	0	0	2
PMT 710	Feasibility Study and Report	2	0	0	2
PMT 712	Business Law	2	0	0	2
PMT 714	Managerial Economics	2	0	0	2
	Total				16

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
PMT 719	Seminar	0	0	6	2
PMT 799	Research Project	0	0	18	6
	Total				8

COURSE SYNPOSSES

PMT 701: ACCOUNTING FOR MANAGERS (3 UNITS)

Accounting as a subject and field of study. The role of accounting in an economic unit. Users of accounting information. Elements of accounting – Financial accounting cost accounting. Management accounting. Accounting records and analysis – source document and books of accounts. Methods of accounting record – the double entry system. Accounting records up to the trial balance. Preparation of financial statements from accounting records. Final accounts – the profit and loss account. Balance sheet and sources and application of funds. Accounting principles and conventions.

PMT 702: OPERATIONS RESEARCH (3 UNITS)

History of Operations Research (O.R). Phases of an O. R. Project O.R. and its system orientation. Linear programming

model. (Graphical only). Activity analysis applications. Some variants of linear programming, transportation model and the assignment model. Project planning and duality techniques. Critical Path Method (CPM) and Project Evaluation Review Technique (PERT). Inventory control (DETERMINISTIC CASE). Simplex method of linear programming; Principles of the simplex method; Duality theory and its applications. Non Linear Programming, multiples, equality- constrained, Kuhn-Tucker and condition. Application methods, application to investments planning, work- force plan replacement problems etc. Introduction to waiting line (Queuing Models), arrival time distribution, service time distribution, the basic waiting line models, multiple channel models, applications of Markov Chains, Markov systems, n- step transition probabilities, classification of finite Markov Chains. Some application.

PMT 703: QUANTITATIVE TECHNIQUES (2 UNITS)

The nature and objectives of statistics. Frequency distributions. Measures of location. Measures of dispersion. Essentials of probability distributions. Basic sampling techniques. Decision theory and index numbers. Time series. Correlation and regression analysis. Set theory. Differential and integral calculus. Matrix algebra. Mathematics of investment. Optimization techniques.

PMT 704: CONSTRUCTION TECHNOLOGY AND MATERIALS (3 UNITS)

Civil engineering construction, Road pavement, Bridges, Dams, Harbour works, Rail tracks, Airports, Tunneling, Sewage treatment installation etc. Communication system, structural timber, concrete technology, innovation in construction materials and use of local materials.

PMT 705: PRINCIPLES OF MARKETING (2 UNITS)

Marketing concept, Evolution and significance. Marketing functions and institutions. The marketing system, marketing environment, buyers behavior, market segmentation, market measurement and forecasting. Marketing research and demand analysis. Price determination and factors in price setting. The marketing mix: the product concept, product development and life cycle, product classification, marketing strategies, management of the channels of distribution. Promotion: Advertising, personnel selling, public relations and sales promotion marketing and professional services. Appraising the marketing effort.

PMT 706: COMPUTER PRINCIPLES AND APPLICATION (2 UNITS)

Computer history, System theory. System design and analysis. Data network. File structure and file organization. Principles of data design. Data manipulation and administration. Methods of data collection and coding and output. Principles of programme stored instructions and languages. Modes and structured programmes.

PMT 707: PRINCIPLES AND PRACTICE OF MANAGEMENT (2 UNITS)

Meaning and concepts of management. The evaluation of management thought. The planning process. Setting of organizational design. Making organizations more effective. Staffing the organization. Communication and motivation leadership. Organization change and development. Organization structure: Theories and principles. Classical system and contingency theories of organization. Relationship between organizational objectives and structures. Centralization and Decentralization. Line and staff relationship with other departments. Major influences of organizational structure-technology. Organization size, external environment and culture. The dynamics of organization.

PMT 708: PROJECT PERFORMANCE MANAGEMENT (2 UNITS)

Introduction to construction productivity analysis and performance management. Life cycle performance measurement system. Balance Score card. Key performance indicators-Factors affecting construction productivity. On-site factors – job conditions, preplanning management coordination, human factors, equipment utilization, material handling, site organization, work environment (temperature, humidity and wind), Off-site factors – government regulation, financial status organization and contractual constraints, suppliers etc. Direct productivity measurement, production units/inputs. Indirect productivity measurement, work sampling five-minute rating, time-motion study etc. Construction productivity improvement, constructability study, selection of designer contractor and construction measurement firm etc. Benchmarking – history & benchmark.

PMT 709: FINANCIAL MANAGEMENT FOR MANAGERS 3 UNITS

Nature and scope of financial management. The goals of the firm. Sources of finance. Mathematics of finance. Capital investment decisions, including traditional and discounted cash flow appraisal methods. Reasons for and resolution of conflicts in investment ranking, using the NPV and IRR methods. Cost of capital, Theory of capital structure. The concept of leverage. Financial intermediation.

PMT 710: FEASIBILITY STUDY AND REPORT (2 UNITS)

Nature and purpose of feasibility reports. Feasibility study limitations. Steps in feasibility study development. The place of feasibility studies in a project. Components or segments of feasibility studies. Financial analysis in feasibility reports, including cash flow projections, projected income statement and balance sheet. Economic viability appraisal in feasibility reports using accounting rate of return, payback period, internal rate of return and net present value methods. Differences between financial and viability analysis of private sector and public sector projects. Financial and viability appraisal of public sector project.

PMT 711: PRINCIPLES OF INSURANCE (2 UNITS)

Concept of insurance and relationship with Business. Classes of general insurance: insurance of property-fire, social, perils, theft, "ALL RISKS" covers pecuniary loss-business interruption, fidelity guarantee. Insurance of liability-public liability, employers liability. Insurance of transportation-private and commercial vehicles, goods in transit by land. Personal insurance-personal accident and sickness insurance, permanent life assurance –whole, endowment assurance, term assurance. Distinctions between insurable and uninsurable risks. How insurance bundles risk-the insurance pool, reinsurance and co-insurance, risk management identification and analysis of risk, risk reduction, transfer risk. Insurance law: utmost good faith, insurable interest, indemnity, subrogation and contribution. Claims settlement and the application of the indemnity principle, proximate cause. The insurance market: proprietary and mutual companies, reinsurance companies. Insurance brokers and agents, loss adjusters, international insurance and reinsurance markets.

PMT 712: BUSINESS LAW (2 UNITS)

Nature of contract and contractual obligations. Formation of contract-offer and acceptance, consideration, intention to create legal relations. Contents of contract-representations, express terms, implied terms, excluding and limiting terms. Nature and definition of contract of sale of goods, conditions, warranties and representation arising thereof, sellers obligation as to quality and delivery, ownership and risk, problems incidental to documentary transactions and carriage of goods. Definition of agency, relationship between the principal, agent and third parties, types of agents, termination of agency, the rights and liabilities of both the principal and agent towards each other and towards the third party. Legal effects of negotiable instruments, including cheques, promissory notes bills of exchange, negotiability and assignability. Nature of insurance contracts, insurable interest, principles of indemnity, principle of uberrimae fide, express and implied terms of the insurance policy, assignment of insurance policy and reinsurance. Forms of business of organization: sole proprietorship, partnership. Formation of incorporated companies, certificate of incorporation, articles of association; and memorandum.

PMT 713: HUMAN RESOURCE MANAGEMENT (2 UNITS)

The scope, nature, methods and principles of organizational human resources management. Policies and personnel division issues such as manpower planning technique, staffing, human resources training and development, career planning and promotion, deployment, career planning and promotion, deployment, discipline, motivation theory and promotion employee welfare. Principles and techniques of job evaluation. Review of current principles and practices of human resource management in the Nigerian context.

PMT 714: MANAGERIAL ECONOMICS (2 UNITS)

Nature and scope of managerial economics. Business conditions and environment. Forecasting methods and economic analysis of business decisions. Applied macroeconomics to business operations. Theory of demand, theory of production, price theory, theory of profit and profit maximization, theory of capital and investment. Macro economics applied to business environment. Factors determining the economic environment of a country. Management theory and accounting. Quantitative elements in managerial economics theory of firms: objectives of business firms, problems in profit management. Depreciation objective: theory versus practice; determination of a reasonable profit target.

PMT 715: ENGINEERING PROJECT PLANNING AND MANAGEMENT (3 UNITS)

Planning, control and evaluation of large scale project. Scheduling, contract system technology, project productivity. Human factors, including technical, political, economic, social and environmental factors. Simulation of the planning, design and construction processes. Network based systems for planning, time and cost of projects. Organization structures for communication and control. Economics of scale in building design, and operations, contrast and documents.

PMT 717: APPLIED RESEARCH METHODS (3 UNITS)

Basic elements of scientific enquiry. The nature and aims of research, types of research, preparation of research proposal. Essential parts of research proposal. Hypothesis and hypothesis testing data collection and analysis, nature and types of questionnaire, sampling and sampling techniques. The significance of theory in research. Presentation of the complete work or organization of thesis. Mechanics and styles of research report. Student will select a researchable topic for seminar presentation at the department for comments and grading.

PMT 799: PGD RESEARCH PROJECT (6 UNITS)

Students will be expected to carry out research in a chosen area of project management under the supervision of an academic staff member. The result of the researchable topic should be creative and should be able to proffer solutions to practical problems in the infrastructural and productive sector. It should be presented and defended successfully before a panel of examiners and be graded.

MASTER OF TECHNOLOGY IN PROJECT MANAGEMENT.

3. PROGRAMME PHILOSOPHY

The Master of Technology (M. Tech) and the Doctor of Philosophy (Ph. D) programmes in Project Management Technology are designed to train high-level manpower to manage the infrastructural and productive sectors of the economy. The adequate functioning of the economy depends on how efficiently the infrastructural and productive sectors

are managed. The post-graduate programmes in Project Management Technology aim at creating opportunities for graduates and professionals in the infrastructural and productive sectors to gain advanced technical and managerial knowledge for efficient and effective management of all the aspects of infrastructural and productive sectors. The philosophy of the post-graduate programmes in Project Management Technology is therefore to train high-level technical managers, who will be able to manage resources efficiently within the infrastructural and productive sectors of the national economy.

4. PROGRAMME OBJECTIVES

The specific objectives of the programmes are to:

- (a) develop and enhance professional efficiency in infrastructural and productive sectors;
- (b) provide high-level manpower capable of carrying out research in the development, management and improvement of the infrastructural and productive sectors;
- (c) provide an opportunity for post-graduate training for staff of infrastructural and productive institutions, organizations, firms and agencies within and outside Nigeria;
- (d) acquaint Project Management professionals with recent management techniques in the infrastructural and productive sectors and equip them with the ability to apply the principles and theory of management to efficient project execution;
- (e) expose post-graduate students to both the theoretical and practical aspects of project management studies for advanced research in the infrastructural and productive sectors.

5. PROGRAMME JUSTIFICATION

The vital role of infrastructural and productive sectors in the socio-economic and political development of nations cannot be quantified. This contributes immensely to wealth creation, economic growth, physical and social development. However, there is a noticeable shortage of professional project managers to manage the abundant infrastructural and productive resources in the country efficiently. The Master of Technology (M. Tech) and the Doctor of Philosophy (Ph.D) degree programmes in Project Management Technology are designed to address the problem of inadequate project management professionals in Nigeria. The postgraduate programmes will produce qualified project management professionals who will occupy management positions and also engage in policy formulation and implementation in the infrastructural and productive sectors.

6. ADMISSION REQUIREMENTS

- (a) Master of Technology in Project Management Technology (M. Tech. PMT)
The requirement for admission into M. Tech PMT programme consist of:

- (i) B. Tech in Project Management Technology, B. Eng/B. Tech/B. Sc degree in Management, Social Sciences, Engineering, Environmental Sciences, Agriculture and other related disciplines with a minimum of Second Class Lower division;
- (ii) B. Eng/B. Tech/B. Sc in Project Management Technology, Management, Social Sciences, Engineering; Environmental Sciences, Agriculture and any other related disciplines with a Third Class degree plus a Postgraduate Diploma (upper credit) in Project Management Technology.

Higher National Diploma (HND) in Project Management Technology, Management, Social Sciences, Engineering, Environmental Sciences, Agriculture and other related disciplines from a recognized Polytechnic with a minimum of Upper Credit plus Postgraduate Diploma (upper credit) in Project Management Technology.

7. PROGRAMME DURATION

Ph.D (Project ManagementTechnology)

The duration of the Ph.D programme shall be as follows: Full Time: A minimum of 36 months and a maximum of 48 months. Part Time: A minimum of 48 months and a maximum of 72 months.

8. GRADUATION REQUIREMENTS

(a). M.Tech (Project Management Technology)

To be eligible for the award of the M. Tech degree in Project Management Technology, a candidate must have:

- (i) successfully presented at least two seminars: proposal and final seminars;
- (ii) fulfilled all other conditions as prescribed by the Board of School of Postgraduate Studies of the University;
- (iii) successfully completed and defended a research thesis in an oral examination.
- (iv) acquired a minimum of 35 Units

9. COURSE SYNOPSSES

M. TECH PROGRAMME IN PROJECT MANAGEMENT TECHNOLOGY

FIRST YEAR FIRST SEMESTER

Course Code	Course Title	L	T	P	U
PMT 801	Applied Quantitative Techniques	2	0	3	3
PMT 803	Fundamentals of System Engineering	2	0	3	3
PMT 805	Resources Management	3	0	0	3
PMT 807	Business Law	2	0	0	2

PMT 809	Managerial Economics	2	0	0	2
PMT 813	Financial Management	2	1	0	3
	Electives				3
	Total				19

ELECTIVES

Course Code	Course Title	L	T	P	U
PMT 815	Project Buildability	3	0	0	3
PMT 817	Design Management	2	1	0	3
PMT 819	Materials Management	2	1	0	3
PMT 821	Projects Procurement	3	0	0	3

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
PMT 802	Advanced Project Management	2	0	3	3
PMT 804	Operations Research	3	0	0	3
PMT 806	Project Planning & Control	2	0	3	3
PMT 808	Human Resources Management	2	0	0	2
PMT 810	Management Information Systems	1	0	3	2
PMT 812	Quality Assurance and Control	2	0	0	2
	Electives				2
	Total				17

ELECTIVES

Course Code	Course Title	L	T	P	U
PMT 814	Cost Management	2	0	0	2
PMT 816	Production Management	2	0	0	2
PMT 820	Maintenance Management & Planning	2	0	0	2

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
PMT 897	Seminar	0	0	0	2
PMT 899	Masters Thesis Research Project	0	0	3	12
	Total				14

COURSE SYNOPSSES

PMT 801 APPLIED QUANTITATIVE TECHNIQUES

3 UNITS

Methods, purpose and tools of social/business investigation, scientific methods, purpose of research, tools of research questionnaires, interviews, observation and secondary sources, nature and objectives of statistics, proxy measures, graphic representation of data frequency distributions, measures of location, measures of dispersion, normal distribution, essential or probability, basic sampling techniques, index numbers, time series, correlation and regression analysis.

PMT 802: ADVANCED PROJECT MANAGEMENT 3 UNITS

Different approaches and strategies of project. Management theory and practice. Project Management techniques in the petrochemical and other industries and their application to construction. Principles of organization of project management, control systems and techniques, project monitoring report systems-use and application of linear programming, PERT-CPM and other scheduling techniques. Concept project management; Project characteristics and types; Attributes of a good project manager; Sizes and needs of projects; Project planning and scheduling; Project analysis and evaluation. Capital rationing among multiple projects, methods of capital rationing and project interdependencies.

PMT 803: FUNDAMENTAL OF SYSTEMS ENGINEERING 3 UNITS

Meaning of a system, systems concept, static and dynamic system, feed system behaviour and representation, mathematical description of physical variables, system graphs and diagrams. Formulation of system models, the state space approach, non engineering and engineering system, solution of system models, time domain solution, model solution by transformation, System design, concept control and optimization, computer application in systems design and stimulation.

PMT 804: OPERATIONS RESEARCH 3 UNITS

History of Operations Research (O.R). Phases of an O. R. Project O.R. and its system orientation. Linear programming model. (Graphical only). Activity analysis applications. Some variants of linear programming, transportation model and the assignment model. Project planning and dulling techniques. Critical Path Method (CPM) and Project Evaluation Review Technique (PERT). Inventory control (DETERMINISTIC CASE). Simplex method of linear programming; Principles of the simplest method; Duality theory and its applications. Non Linear Programming, multiples, equality-constrained, Kuhn-Tucker and condition. Application methods, application to investments planning, work-force plan replacement problems etc. Introduction to waiting line (Queuing Models), arrival time distribution, service time distribution, the basic waiting line models, multiple channel models, applications of Markov

Chains, Markov systems, n- step transition probabilities, classification of finite Markov Chains. Some application.

PMT 805: RESOURCES MANAGEMENT 3 UNITS

Concepts of human, materials, financial, entrepreneurial and intellectual property resources. Resources procurement and determinants of resources availability. Management of each of these resources in the establishment, execution, monitoring and completion of projects. Resource aggregation and leveling, materials management and the specialist needs of trade sub-contractors. Resource management by objective (R.M.O.) Other types of resources. Project planning and resource allocation. Resource management tools. Supply and demand of resources. Management of human resources.

PMT 806: PRODUCTION PLANNING AND CONTROL

3 UNITS

Nature and scope of production planning and control. Planning, execution and control. Organisation of PPC. Central programming planning group methods engineering group. Tool engineering NUP. Material planning group. Scheduling group. Shop progress group. Basic concepts of planning production. Planning breakdown, man hour for manufacture learning curve theory. Improvement in manual skills. Improvement in managerial action.

Work study performance indices and norms. Techniques of work measurement. Layout plan facilities. Product layout, process layout, fixed layout. Aggregate production plan. Scheduling. Shop progress. Shop management. Plant maintenance. Management information system. Input information. Output in terms of booked hours and 5MH. Payment. Performance indices. Incentive schemes. Financial incentives for direct workers. Factors affecting productivities.

PMT 807: BUSINESS LAW 2 UNITS

Elements of the law of Contract. Law of Agency; Nature and creation of principal-agent relationship, rights and units interse and vis-a vis third parties, scope of agent's authority, rectification and termination of agency, undisclosed principal, sales of goods and hire purchases and special and special rules relating to such contracts. Bailment's, C.L.F., F.B.O. and ex-shop contracts, Negotiable Instruments: (In outline only) Company Law (In outline only) Insurance Law (In outline only).

PMT 808: HUMAN RESOURCES MANAGEMENT

2 UNITS

The scope, nature, methods and principles of organizational human resource management. Policies and personnel division issues such as manpower planning techniques, staffing, human resources training and development, career planning and promotion, deployment, discipline, motivation theory and promotion employee welfare. Principles and techniques of job evaluation. Review of current principles

and practices of human resource management in the Nigerian context.

PMT 809: MANAGERIAL ECONOMICS 2 UNITS

Scope of managerial economics. Demand decision. Production decision. Introduction to managerial economics. Optimization techniques. Demand theory. Demand analysis. Consumer behaviour and rational choice. Estimating demand function. Business and economic forecasting. Production theory. Technological change and industrial innovation. The analysis of cost. Perfect competition. Sophisticated monopoly pricing. Game theory. Risk analysis. Auctions. Moral hazard and principal agent problems. Government and business. Wrap up/catch up. Nature and scope of managerial economics. Demand and supply. Consumer demand, demand analysis and demand estimation. Forecasting, production analysis and competitive markets and performance in competitive markets. Monopoly and monopsony. Monopolistic competitive strategy. Pricing practices. Risk analysis, capital budgeting. Government of the marketing economy.

PMT 810: MANAGEMENT INFORMATION SYSTEMS 2 UNITS

Introduction to, and fundamentals of data processing brief history and conventional data, processing methods, manual and mechanized methods. Classification of systems and their relative merits. Closed and open loop systems; effect on time lag; the total system approach and objectives; total systems and sub-systems. Data processing and the Management Information Systems (MIS). The organization of MIS including use of mechanical and electric accounting machines, Flow charting and the principles of systems design and documentation. Managerial uses of the information output as a basis for developing; criteria and systems. Information needs of management and design of MIS, Computer and data processing evolution of the computer and the computer system input, output and control processing unit. Hardware and software introduction to common computer programming languages used in business. (CCBCL FORTRAN, SPSS etc. Electronic Data Processing (EDP) methods; batch processing, real-time processing and the management of EDP. Business system hierarchical structure of organization, the sub-optimisation issues.

PMT 812: QUALITY ASSURANCE AND CONTROL 2 UNITS

Introduction: Quality Assurance. Principles and Application of Quality Management. Strategic Planning and risk management (product or service). Leadership in quality and Business Management. Quality Assurance and Production or productivity. Concept/ principles of Total Quality Control. Quality Assurance Tools and System. Quality Measurement. Quality and auditing. Benchmarking. Supplier Quality Management. Statistical Process Control.

PMT 813: FINANCIAL MANAGEMENT 3 UNITS

Nature, scope and objectives of business finance, profit maximization versus wealth maximization as objectives of business finance. Acquisition of capital long term, medium term and short term capital. Cost of Capitalization, rate value firm, effects of gearing on capitalization and the value of firm. Dividend policy, Investment policy. Evaluation of capital expenditure criteria used such as pay-back period methods, accounting rate of return discounted cash flow method including the use of NPV and IRR. Profitability index and Evaluation of capital expenditure under ideal and the real world situation.

PMT 814: COST MANAGEMENT 2 UNITS

Introduction: Meaning of cost and different types of costs. Concept of cost management. Capital budgeting: Concept and method. Target costing. Quality cost. Theory of constraints. Activity based costing and management. Performance Measures factories. Activity based costing. Activity analysis, cost behaviour. Cost management system. Customer profitability analysis. Cost behaviour Patterns. Cost estimation methods. Decision making, relevant cost and benefit. Target costing for new product development. Allocation of cost and revenue. Cost volume and profit analysis.

PMT 815: PROJECT BUILDABILITY 3 UNITS

Buildability is the provision of construction details and materials, which is simply the construction process, Integration of design and construction to improve the chances of achieving a better quality project, completed in a safe manner, on schedule and with the least cost. Principles/Concept of buildability. Design management/planning or project planning. Construction safety and legislation. Construction machinery. Construction cost and construction time. Investment/cost management. Risk management. Buildability score and management. Buildability management system.

PMT 816: PRODUCTION MANAGEMENT 2 UNITS

Analysis of production resources; planning scheduling and forecasting, measurement and evaluation of man machine system; quality and quantity controls; production function models; non-production technologies. Manufacturing and operations strategy, product design and development, quality; performance measurement, plant and machinery acquisition and replacement decisions, scheduling, planning and control of production and inventory, logistic modeling; impact of advanced manufacturing technology; the influence of Japanese management such as Just-in-time (JIT) and Total quality Management (TQM).

PMT 817: DESIGN MANAGEMENT 3 UNITS

Extended definition of design management. Definition of design, management and design leadership. Managing

product aesthetics and corporate design (early contributions). Managing design systematically. Managing design as a strategic asset. Managing design for innovation. Notion of the term "design management". Politic. Promotion and conference. Education. Research. Production design management. Brand design management. Service design management. Business design management. Engineering design management. Urban design management. Architectural management. Value for business. Relation to other disciplines and departments. Hierarchy. Role and responsibility. Design policy. Education.

PMT 819: MATERIALS MANAGEMENT 3UNITS

Concepts of material management – principles, philosophy and source implication for organization. Supply and Demand interfaces and contrast conditions; cost implications for materials management; Quality control, static inventory, problems under risk and uncertainty Logistics management – elements of transportsations, elements of storage and material handling; Logistics environment and Logistics organization and control.

PMT 820: MAINTENANCE MANAGEMENT AND PLANNING 2 UNITS

Defining the maintenance level - Maintenance by plan vs. maintenance by default. Equipment reliability and availability. Building a maintenance management plan. Setting and achieving goals. Planning and estimating – Construction estimating methods. Methods time measurement. The maintenance planning thought process – A common sense approach to maintenance estimates. Estimates Based on past performance. Improving the accuracy of estimates. Work packages. Building generic plans. Solving material problems. Preventive and predictive maintenance – Preventive maintenance defined. Mandatory and discretionary preventive maintenance. Prioritizing candidates for preventive maintenance. Building credible preventive maintenance procedures. Sources of generic preventive maintenance procedures. Sources of generic preventive maintenance procedures. Audits for procedures and programs. Converting preventive to predictive maintenance (PDM). The spectrum of predictive maintenance. Establishing engineering limits. The scheduling process – Prioritizing maintenance work. Dealing with emergencies. Plotting the backlog. Allocation scheduling method. Priority numbering systems. Weekly and daily schedules. Critical path methods for maintenance – Definitions and conventions. Diagramming methods. Identifying the precedent logic. Dealing with of float (slack). Load leveling resources. Turnarounds, shutdowns and outages.

PMT 821: PROJECTS PROCUREMENT 3UNITS

Different methods of building procurement. Traditional, Design and Build. Management contracting. Contracts, BPF system. BOOT partnership etc. Interpretation of the client's requirement. The evolving nature of projects objectives and the need for the continual Management of the clients/project

interface. Management structure- Procurement policy. The role of the expert adviser. Engaging an external expert adviser. Other service providers. Selecting service providers. Managing service providers. Procurement advise. Project characteristics and risks – finding, timing, policy matters, project complexity, agency requirements, brief. Estimating contract time. Risk identification and allocation – Project risks. Risk allocation through contracts. Contracting options – Developed Design (DD), Design Development and Contract (DD&C), Design, Novate and Contract (DN & C), Design and Contract (D & C) and Guaranteed Maximum Price (GMP), multiple contracts managing contractor, Alliance contract, Privately Financed Project (PFP). Determining an appropriate contracting option – Source of fund. Complexity and risk profile of the project design brief. Time constraints. Budget limitations cash flow restrictions. Physical constraints pricing of contract risk. Maintenance requirements.

PMT 897: SEMINAR 2 UNITS

This should consist of an independent work with sound theoretical and investigative approach in a chosen area of project management.

PMT 899: MASTER'S THESIS RESEARCH PROJECT 12 UNITS

This should consist of an independent work with sound theoretical and investigative approach in a chosen area of project management leading to an original contribution to knowledge.

DOCTOR OF PHILOSOPHY IN PROJECT MANAGEMENT

1. PROGRAMME PHILOSOPHY

The Master of Technology (M. Tech) and the Doctor of Philosophy (Ph. D) programmes in Project Management Technology are designed to train high-level manpower to manage the infrastructural and productive sectors of the economy. The adequate functioning of the economy depends on how efficiently the infrastructural and productive sectors are managed. The post-graduate programmes in Project Management Technology aim at creating opportunities for graduates and professionals in the infrastructural and productive sectors to gain advanced technical and managerial knowledge for efficient and effective management of all the aspects of infrastructural and productive sectors. The philosophy of the post-graduate programmes in Project Management Technology is therefore to train high-level technical managers, who will be able to manage resources efficiently within the infrastructural and productive sectors of the national economy.

2. PROGRAMME OBJECTIVES

The specific objectives of the programmes are to:

- (a) develop and enhance professional efficiency in

- (b) infrastructural and productive sectors;
- (c) provide high-level manpower capable of carrying out research in the development, management and improvement of the infrastructural and productive sectors;
- (d) provide an opportunity for post-graduate training for staff of infrastructural and productive institutions, organizations, firms and agencies within and outside Nigeria;
- (e) acquaint Project Management professionals with recent management techniques in the infrastructural and productive sectors and equip them with the ability to apply the principles and theory of management to efficient project execution;
- (f) expose post-graduate students to both the theoretical and practical aspects of project management studies for advanced research in the infrastructural and productive sectors.

3. PROGRAMME JUSTIFICATION

The vital role of infrastructural and productive sectors in the socio-economic and political development of nations cannot be quantified. This contributes immensely to wealth creation, economic growth, physical and social development. However, there is a noticeable shortage of professional project managers to manage the abundant infrastructural and productive resources in the country efficiently. The Master of Technology (M.Tech) and the Doctor of Philosophy (Ph.D) degree programmes in Project Management Technology are designed to address the problem of inadequate project management professionals in Nigeria. The postgraduate programmes will produce qualified project management professionals who will occupy management positions and also engage in policy formulation and implementation in the infrastructural and productive sectors.

4. ADMISSION REQUIREMENTS

To be eligible for the admission into the Ph.D programme in PMT, a candidate must have:

- (i) M.Tech (Project Management Technology) degree of The Federal University of Technology, Akure or any other recognized institution, with a weighted average of 60% or at least 3.50 on the five point CGPA scale.
- (ii) Candidates for admission into the Ph.D programme must also meet the basic University requirements.

5. PROGRAMME DURATION

(a) Ph.D (Project Management Technology)

The duration of the Ph.D programme shall be as follows:

Full Time A minimum of 36 months and a maximum of 48 months.

Part Time A minimum of 48 months and a maximum of 72 months.

6. GRADUATION REQUIREMENTS

(a) Ph.D (Project Management Technology)

To be eligible for the award of the Doctor of Philosophy in Project Management Technology, a candidate must have:

- (i) passed all courses recommended (if any) by the Department;
- (ii) successfully presented at least three seminars (proposal, progress and final);
- (iii) fulfilled all other conditions as prescribed by the Board of School of Postgraduate Studies of the University; and successfully completed and defended a research thesis in an oral examination.

MASTER OF TECHNOLOGY IN MANAGEMENT SCIENCE

1. PROGRAMME PHILOSOPHY

The Master of Technology (M.Tech) and the Doctor of Philosophy (Ph.D) programmes in Management Sciences are designed to train high-level manpower to manage the productive resources of the nation, particularly in the Infrastructural and productive sector of the economy. The proper functioning of the economy depend on how efficiently the Infrastructural and productive sector are managed. The Post-graduate programmes in Management Sciences aim at providing opportunities to graduates and professionals in the Infrastructural and productive sector to gain advanced technical and managerial knowledge for efficient and effective management of all the aspects of Infrastructural and productive sector. The philosophy of the Post-graduate programmes in Management Sciences is therefore to train high-level technical managers, who will be able to allocate and manage resources efficiently within the Infrastructural and productive sector.

3. PROGRAMME OBJECTIVES

The specific objectives of the programmes are to:

- (a) Develop and enhance professional competence in Infrastructural and productive sector management.
- (b) Provide high-level manpower capable of fostering investigation and research in the development, management and improvement of the Infrastructural and productive sector.
- (c) Provide an opportunity for Post-graduate training for staff of Infrastructural and productive Institutions, Organization, Firms and Agencies within and outside Nigeria.
- (d) Acquaint Management Sciences professionals with recent technological advances and management techniques in the Infrastructural and productive sector, and equip them with the ability to apply the principles and theory of management in the Infrastructural and productive sector.
- (e) Expose Post-graduate students to both the theoretical and practical aspects of management sciences studies and prepare them for advanced

research in the Infrastructural and productive sector.

4. JUSTIFICATION FOR THE PROGRAMME

The vital role of Infrastructural and productive sector in the socio-economic and political development of nations cannot be overemphasized. It contributes immensely to wealth-creation, economic growth and social development. It also promotes commerce, communication, spatial interaction and physical development. However, there is a noticeable shortage of professional managers to manage the abundant Infrastructural and productive resources in the country efficiently. Non-project professionals now occupy management positions in both public and private project establishments in Nigeria. The master of Technology (M.Tech) and the Doctorate (Ph.D) degree programmes in Management Sciences are designed to address the problem of inadequate professionals in Nigeria. The Postgraduate programme will produce qualified management sciences professionals who will occupy management positions, and also engage in policy formulation and implementation in the Infrastructural and productive sector.

5. ADMISSION REQUIREMENTS

- (a) **Master of Technology (M. Tech) in Management Sciences**
- (i) Candidates must have at least a Second Class Lower in B.Tech/B.Sc/B.A Degree in Management Sciences, Management, Social Sciences, Engineering; Environmental Sciences, Agriculture and other related disciplines.
 - (ii) Postgraduate Diploma (upper credit) in Management Sciences, or Management from a recognized University.

6. PROGRAMME DURATION

- (a) **M.Tech (Management Sciences)**
Full Time 18 months.

7. REQUIREMENTS FOR THE AWARD OF DEGREE

Candidate must complete the minimum course units as specified below to qualify for the award of the Degree:

- (i) **M.Tech (Management Sciences):**

Note: The minimum course units must include 6 units of Project Report.

FIRST SEMESTER FIRST YEAR

Course Code	Course Title	L	T	P	U
MGS 641	Management theory and process	2	0	0	2
MGS 643	Managerial Economics	2	0	0	2
MGS 645	Business Statistics & Research Method	2	0	0	2

MGS 647	Accounting and Finance	2	0	0	2
MGS 649	Quantitative Techniques	2	0	0	2
MGS 651	Business Law	2	0	0	2
	Total				12

FIRST YEAR SECOND SEMESTER

Course Code	Course Title	L	T	P	U
MGS 642	Human Resources Management	2	0	0	2
MGS 641	Production Management	2	0	0	2
MGS 646	Organization theory (Behaviour)	2	0	0	2
MGS 648	Managerial Accounting & Finance	2	0	0	2
MGS 650	Computer Applications in Business	2	0	0	2
MGS 652	Marketing Management	2	0	0	2
	Total				12

SECOND YEAR THIRD SEMESTER

Course Code	Course Title	L	T	P	U
MGS 653	Business Policy & Strategic Management				2
MGS 655	Financial Management				2
MGS 657	<small>Master's Seminar</small>				2
MGS 699	Masters Thesis Project				6
	Total				12

Basis of awarding degree – Minimum of 36 Units out of which 30 units must be compulsory courses and 6 units for thesis

COURSE SYNOPSSES

MGS 641: Management Theory and Process 2 Units

This course will deal with the evolution of management as both theory and practice; the role and nature of management in different socio-economic system; the functions of management; human factors in management; approaches to the measurement and the control of organizational performance; organizational efficiency and effective handling of delegation and time, in organization and management development; organization design; problems of management in the under-developed as well as developed

countries and emergent perspective and practice.

MGS 642: Human Resources Management 2 Units

The most valuable and most dynamic of all resources is the topic of this course. The students would be required to understand the principles and processes involved in the procurement, utilization, and compensation of human resource. Topics covered included modern organization theories, forecasting and planning of human resources; the relevance of productivity and the concepts of its measurement, recruitment, selection including tests and interviews and evaluation, performance appraisal, leadership and satisfaction theories and practices, wages-theories and administration; trade unionism in Nigeria and in the international context, collective bargaining factory administration, etc.

MGS 643: Managerial Economics 2 Units

Purpose and scope of managerial economics. Environment of the firm. Demand analysis. Demand forecasting. Product policy and product innovation. Cost analysis. Market structure and competition. Pricing. Profit analysis. Marginal analysis. Financial appraisal. Legal and regulatory environment of the firm. Mergers, integration, diversification, advertisement, performance analysis, etc.

MGS 644: Production Management 2 Units

The concept of production/operation management. Managing production system. The strategies role of production operation. Optimality and multiple objectives. Sub optimization. Output and revenue. Mathematical treating of breakeven (B.E.P.). Facility layout. Material handling. Organizing and staffing for production operation. The flow shop and job shop. The assignment method. The transportation Algorithm. Inventory management. Capacity planning. Man and Machine.

MGS 645: Business Statistics and Research Method 2 Units

This course includes basic notion of probability, descriptive data analysis, statistical inference and simple regression analysis. The course is designed to improve the ability of students to carry out empirical research and to evaluate published research. Topics covered include the nature of scientific research, theory building and concept definition, formulating hypothesis, validity and reliability, measurement and scaling methods, concepts, and problems in data collection and sampling, criteria for causal inferences, studies and control groups, considerable time will be devoted to report writing including editing, foot noting, etc.

MGS 646: Organization Theory and Behavior 2 Units

A survey of the major theoretical approaches to the study of organization critical review of the contribution of the major organization/administrative theories. An examination of the

analysis of organization as systems with emphasis on the assessment of their operational effectiveness and efficiency. A discussion of the relevance of organization/administrative theories to public business administration with special reference to Nigeria and African experience.

MGS 647: Accounting and Finance 2 Units

Accounting as a subject and field of study. The role of accounting in an economic unit. Users of accounting information. Elements of accounting – financial accounting. Cost accounting, management accounting, auditing and tax accounting. Accounting records and analysis. Sources and books of accounts. Method of accounting records – the double entry system. Accounting records up to the trial balance. Preparation of financial statements from accounting records. Final accounts – the profit and loss account, balance sheet and sources and application of funds. Accounting principles and conventions.

MGS 648: Managerial Accounting and Finance 2 Units

Control theory in accounting, feedback open and closed loop system. Types of standard costs; principles of setting performance standards and value standards. The analysis, significance and investigation of variance, Budgeting concept; budgetary control, involvement and motivation, the fixed and flexible budgets centers. The budget period and identification of the principal factor. Variance analysis. Responsibility accounting. Performance evaluation techniques.

MGS 649: Quantitative Techniques 2 Units

Elementary set theory function; inequalities; graphs and elementary matrix operations. The formulation of mathematical models, basic notion of differential and integral calculus with business applications and general treatment of applications of linear programming and similar techniques. Linear programming, simplex algorithm and duality, transportation and assignment algorithm. Game theory, Queuing theory, inventory theory, market chains, mathematical programming and elements of goal programming.

MGS 650: Computer Application in Business 2 Units

Computer history, system theory, system design and analysis, data network, file structure and file organization. Principles of data design. Data manipulation and administration methods of data collection. Computer hardware and software. Memory and backing store, input and output devices, and data communication, Input and Output control.

MGS 651: Business Law 2 Units

Topics covered include: Laws of contract, agency, sale of goods, hire purchase, carriage of goods, negotiable instrument, money lending, suretyship and guarantees basic provisions of law governing, insurance and banking

institutions in Nigeria. An introduction to sources of Nigeria law, administration of justice in Nigeria, civil and criminal liability, real and personal property, partnership law, corporate personality and the doctrine of ultravires. Types of companies, company formation, procedure and documentation issue and transfer of shares and debentures, prospectus and statutory books, meetings and resolutions, duties of officers (directors, secretary, etc.) provision relating to disclosure in corporate accounts reconstructions amalgamation and take-overs. Laws relating to bankruptcy, deeds of arrangement voluntary and compulsory liquidation, disposition of property by wills and letters of administrations, etc.

MGS 652: Marketing Management 2 Units

This course begins with a study of the underlying forces, which shape marketing decisions such as the marketing systems, demand, consumer motivation and behavior, and the economic, legal, political, and socio-cultural contents within which all marketing decisions must be made. Considerable attention is devoted to the analysis of the components of a good marketing strategy (target – market selection, product, price, promotion, and distribution decisions) and the integration of these elements into an internally and externally consistent whole. Other topics covered include marketing intelligence and social and ethical issues in marketing as they relate to marketing plan formulation and implementation.

MGS 653: Business Policy and Strategic Management 2 Units

The course aims at providing the participants an integrated view in the management of organization and exposing them to situation requiring utilization of multidimensional approach. Care would be taken to provide them with necessary skills and attitudes for formulation and implementation of corporate basic policies and strategies in the contexts of organizational goals, opportunities and challenges.

MGS 655: Financial Management 2 Units

The nature and scope of financial management and its relationship of financial, cost and management, internal and external sources of finances, analysis and interpretation of financial statements and other financial information. Evaluation of capital expenditure proposals, control of capital expenditure. Investment policy cost of capital, dividend policy.

MGS 657: Masters Seminar 2 Units

MGS 699: M.Tech Management Sciences Thesis Project 6 Units

1. DOCTOR OF PHILOSOPHY (Ph.D) IN MANAGEMENT SCIENCES

2. PROGRAMME PHILOSOPHY

The Master of Technology (M.Tech) and the Doctor of Philosophy (Ph.D) programmes in Management Sciences are designed to train high-level manpower to manage the productive resources of the nation, particularly in the Infrastructural and productive sector of the economy. The proper functioning of the economy depend on how efficiently the Infrastructural and productive sector are managed. The Postgraduate programmes in Management Sciences aim at providing opportunities to graduates and professionals in the Infrastructural and productive sector to gain advanced technical and managerial knowledge for efficient and effective management of all the aspects of Infrastructural and productive sector. The philosophy of the Post-graduate programmes in Management Sciences is therefore to train high-level technical managers, who will be able to allocate and manage resources efficiently within the Infrastructural and productive sector.

3. PROGRAMME OBJECTIVES

The specific objectives of the programmes are to:

- (a) Develop and enhance professional competence in Infrastructural and productive sector management.
- (b) Provide high-level manpower capable of fostering investigation and research in the development, management and improvement of the Infrastructural and productive sector.
- (c) Provide an opportunity for Post-graduate training for staff of Infrastructural and productive Institutions, Organization, Firms and Agencies within and outside Nigeria.
- (d) Acquaint Management Sciences professionals with recent technological advances and management techniques in the Infrastructural and productive sector, and equip them with the ability to apply the principles and theory of management in the Infrastructural and productive sector.
- (e) Expose Post-graduate students to both the theoretical and practical aspects of management sciences studies and prepare them for advanced research in the Infrastructural and productive sector.

JUSTIFICATION FOR THE PROGRAMME

The vital role of Infrastructural and productive sector in the socio-economic and political development of nations cannot be overemphasized. It contributes immensely to wealth-creation, economic growth and social development. It also promotes commerce, communication, spatial interaction and physical development. However, there is a noticeable shortage of professional managers to manage the abundant Infrastructural and productive resources in the country efficiently. Non-project professionals now occupy management positions in both public and private project establishments in Nigeria. The master of Technology (M.Tech) and the Doctorate (Ph.D) degree programmes in Management Sciences are designed to address the

problem of inadequate professionals in Nigeria. The Postgraduate programme will produce qualified management sciences professionals who will occupy management positions, and also engage in policy formulation and implementation in the Infrastructural and productive sector.

5. ADMISSION REQUIREMENTS

- (a) Doctor of Philosophy (Ph.D) Programme
 - (i) M.Tech (Management Sciences) degree of The Federal University of Technology Akure or any other recognized institution, with a weighted average of 60% or at least 3.50 on the 5 point CGPA scale.
 - (ii) Candidates for admission into the Ph.D programme must also meet the basic University requirements.

6. PROGRAMME DURATION

- (a) Doctor of Philosophy (Ph.D) programme

Full Time (36 months)

Part Time (48 months)

7. REQUIREMENTS FOR THE AWARD OF DEGREE

Candidate must complete the minimum course units as specified below to qualify for the award of the Degree:

(a) The Doctor of Philosophy (Ph.D) Management Sciences

The Doctor of Philosophy (Ph.D) degree in Management Sciences is by research. All Ph.D candidates are expected to carry out research projects and must be supervised by approved Postgraduate lecturers. The research project must also be successfully defended by the candidate in a viva voice examination before a panel of examiners constituted by the School of Postgraduate studies. To qualify for the award of the Ph.D, the project must be of high scholarly value, and must also make salient contribution to the existing body of knowledge. In addition, the candidate must satisfy all other existing requirements as stipulated in the regulations of the Postgraduate school.

AVAILABLE ACADEMIC STAFF

S/N	NAME	QUALIFICATIONS	STATUS	SPECIALIZATION
1.	Dr. O. J. Ojo	B.Sc., M.Sc., Ph.D (O.A.U.)	S/ Lecturer / Ag. HOD	Technology Management
2.	Prof. Z. O. Opafunso	M.Sc. (SDSM&T, USA), MBA (USD, USA), Ph.D (Akure). FNSE,MNIM	Professor	Operations Research
3.	Prof. R. O. Abiola	B.Sc. (UNN), MBA, Ph.D (Benin)	Professor	Bus. Adm in. (Bus. Policy, Marketing), Human Resources Management
4.	Prof. P. B. Imoudu,	B.Sc, M.Sc, Ph.D	Professor	Agric. Economics
5.	Prof. D. R. Ogunsemi	B.Sc, M.Sc, Ph.D	Professor	Construction Management, Construction Performance
6.	Prof. M. O. Bello	B.Sc, M.Sc, Ph.D	Professor	Land Management, Real Estate Investment and Analysis.
7.	Prof. A. G. Daramola	B.Sc, M.Sc, Ph.D	Professor	Agric. Economics
8.	Dr. (Mrs.) M. O. Ajayi	B.A. Ed, MPA, M. Phil (Bus Admin), Ph.D Mgt Sc.	S/ Lecturer	Human Resources Management
9.	Prof. B. Kareem	B. Eng (FUTA), M. Eng (FUTA), Ph. D (FUTA)	Professor	Industrial Engineering
10.	Dr. P. K. Oke	B. Eng (OSUA), M. Eng (FUTA), Ph. D (FUTA)	Reader	Industrial Engineering
11.	Dr. B. O. Akinnuli	B. Eng (FUTA), M. Eng (FUTA), Ph. D (FUTA)	S/ Lecturer	Industrial Engineering
12	Dr. A. F. Lawal	B.Sc., M.Sc., Ph.D (OAU), FNIOB, ANIST, MNIM	S/ Lecturer	Technology Management, Project Planning and Control, Energy Management in Buildings.
13.	Dr. J. J. Obembe	B.Sc.(Ife), M.Tech. (Aku re), MBA (Ibadan)	Lecturer I	Management
14.	Dr. (Mrs.) A. O. Adedeji	B.Ed. (Ibadan), MBA (Akure); M.Ed. (Ilorin), Ph.D (Ado)	Lecturer I	Management

9.5.2 DEPARTMENT OF TRANSPORT MANAGEMENT TECHNOLOGY (TMT)

Available Postgraduate Programmes:

- A. Diploma (PGD) Programme in Transport Management Technology Department
 - B. Professional Masters (MTMT) in Transport Management Technology Department
 - C. Master of Technology (M.Tech.) in Transport Management Technology Department
 - D. Doctor of Philosophy (Ph.D.) in Transport Management Technology Department/
-
- A. Postgraduate Diploma (PGD) Programme in Transport Management Technology Department

1. Programme Philosophy

The Postgraduate Diploma (PGD) programme in Transport Management Technology is designed to meet the manpower requirement in the transport sector. The programme aims to train graduates from a variety of background to become knowledgeable in Transport Management, and to qualify for professional or academic degree in Transport Management. The philosophy of the postgraduate programme in Transport Management is therefore to train graduates to acquire technical and managerial knowledge for efficient and effective management of all aspects of transport, and also to prepare them for a career in transport management.

2. Programme Objectives

The objectives of the programme are to:

- i. expose postgraduate students to both the theoretical and practical aspects of transport and logistics management;
- ii. provide postgraduate students with sufficient knowledge and skill to work competently in management positions in the public and private sectors of the economy;
- iii. promote research in the management and improvement of the transport sector of the Nigerian economy; and
- iv. provide a solid intellectual and methodological foundation for Postgraduate Diploma graduates to proceed to higher studies.

3. Programme Justification

The Postgraduate Diploma Programme in Transport Management Technology is a gap-bridging programme for non-professionals in the transport sector, who are athirst for a professional qualification in transport management. It is also meant for sub-professionals and non-professionals who are currently working in transport establishments, and are desirous of undergoing a professional training in Transport Management. The programme will boost the manpower

requirement in the transport sector and mitigate the problem of dearth of professionals in the field. It will also prepare Postgraduate Diploma graduates for professional certification and academic advancement.

4. Admission Requirements

The requirements for admission into the Postgraduate Diploma programme for Transport Management Technology consist of:

- i. B.Tech. in Transport Management; B. Tech/B.Sc. in Agriculture, Engineering, Urban and Regional Planning, Management Sciences, Social Sciences, or any other related discipline from a recognized University, with a minimum of third class degree.
- ii. Higher National Diploma (HND) or its equivalent with a minimum of Lower Credit in any of the fields listed in (i) above, and other related fields from a recognized Polytechnic.

5. Programme Duration

The Postgraduate Diploma Programme shall be for four semesters, i.e. twenty-four (24) months.

6. Requirements For The Award of Diploma

Candidates must complete a minimum of 48 course units to qualify for the award of Postgraduate Diploma in Transport Management Technology

1. COURSE OUTLINES

FIRST YEAR FIRST SEMESTER

Course Code	Course Title	L	T	P	U
TMT 701	Transport Planning and Policy	2	1	0	3
TMT 705	Traffic Education and Safety	3	0	0	3
TMT 707	Transport and Development	2	1	0	3
TMT 709	Rail Transport	2	1	0	3
	Total				12

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
TMT 702	Research and Quantitative Techniques in Transport Studies	2	1	0	3
TMT 706	Basic Law of Business and Carriage	3	0	0	3

TMT 708	Introduction to Transport Technology	2	1	0	3
TMT 710	Traffic Survey Methods	2	1	0	3
	Total				12

SECOND YEAR FIRST SEMESTER

Course Code	Course Title	L	T	P	U
TMT 711	Financial Accounting and Management	2	1	0	3
TMT 713	Management of Transport Enterprises	3	0	0	3
TMT 715	Maritime Operations and Management	2	1	0	3
TMT 717	Air Transport Operations and Management	2	1	0	3
	Total				12

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
TMT 714	Pipeline Operations and Management	3	0	0	3
TMT 712	Fundamentals of Traffic Management & Control	2	1	0	3
TMT 799	PGD Research Project	0	0	18	6
	Total				12

COURSE SYNPOSSES

TMT 701: Transport Planning and Policy 3Units

Land use and transportation planning. Historical development of transport planning. Data inputs (from surveys), matrix building, origin-destination matrix. Data analysis, trip generation, trip distribution, modal split, traffic assignment, traffic forecasting. Roles of Government in transport development. Identification of key issues in transport policy formulation. Strategies for implementation of Transport Policy. Evaluation of Transport Policies in the different transport sectors.

TMT 702: Research and Quantitative Techniques in Transportation Studies. 3Units

Application of statistical/mathematical concepts in transport planning. Analysis of point patterns. Univariate, Bivariate and multi-variate methods. Mathematical modeling techniques, viz stochastic, optimization and entropy models. Introduction to multi-variate statistical analysis. Factor and Principal Components analysis. Time series analysis; linear programming; introduction to computer application in transport studies.

TMT 705: Traffic Education and Safety. 3Units

Elements of traffic principle and culture. Pedestrian education. Defensive driving: principles and practices. Responsibilities of parents, teachers and passengers; responsibilities of police and other government agencies. Road, rail, sea, and accident statistics. Traffic offence statistics, factors in accident costs, accident counter-measure and safety issues in all modes of transport. Role of government and public enterprises in public transportation. Operation and administration of public transport in Nigeria. Operation and administration of mass-transit programmes by the Federal, State and Local Government in Nigeria.

TMT 706: Basic Law of Business and Carriage. 3Units

Basic types of Business: sole traders, partnership, companies, and limited liability. Principle of company formation; capital share and debentures; directors-appointment and duties. Nature and formation of contract, classes of contract. Special aspects of contracts in transport and distribution. Law of contracts. Corporate personality. Formation of agencies, right and duties between principal and agents as applicable to transport. Sale of goods; sale and agreement to sell, conditions and warranties, transfer of property and title between seller and buyer, remedies of seller and buyer for breach of contract with particular reference to transport industry; Hire purchase.

TMT 708: Introduction to Transport Technology. 3Unit

The technological development of transport from ancient period to the present day, paying attention to reasons why the advancement was successful. Management technology in transport, significance of safety, licensing and environmental organizations. Environmental factors in Transport. Vehicle control and operation, crewless vehicles. Effects of energy shortage on transport and possible solutions. Technologies for urban and inter-urban passenger transport systems. Road capacity and design-standard approaches to road design. Geometric design of streets and highways. Introduction to computer-aided design of junctions and highways. Technologies for road lighting, off-street parking and traffic management. Technologies for signal control at intersections.

TMT 709: Rail Transportation. 3 units

Evolution of rail transport. Rail transport and national economy. Rail operations within the context of through transport. Rail traffic management and control. Railway and freight movement. Railway and passenger movement. Socio-economic and environmental issues in rail transport. Technology and rail transport. Rail operations and safety. Rail transport operations and services. Problems of the rail transport sub-sector. Rail Transport infrastructural system. Rail transport finance and management in Nigeria. Problems affecting rail transport performance and productivity in Nigeria.

TMT 710: Traffic Survey Methods. 3 units.

Types of traffic surveys. Steps in conducting surveys. Traffic volume counts and parking counts. Estimation of traffic delays and speed by moving car observer and other methods. Pedestrian traffic and crossing delays; origin-

destination survey; accident survey; interview survey; screen line cordon survey. Traffic volume studies. Road-use studies, road inventory, road-life studies, travel surveys, registration number survey; post-card survey, the tag and disc method. Modal surveys, goods transportation survey. Survey research. Sampling techniques and data collection instruments in survey research. Sampling and questionnaire construction. Interview, consent analysis, field work data collection and organization. Application to transport research. Survey methods in Maritime, Air and Rail Transport.

TMT 711: Financial Accounting and Management. 3 units.

Concept of Management Accounting and Financial Management Relationship between Management and Financial Accounting Intermediaries; Investment decision; Profit Planning, budgetary controls; risk analysis and decision taking. Project cost control and cost audit. Cost-profit analysis and decision making. Short-team decisions and accounting information. Financial and capital budgeting. Performance evaluation. Quality and quantitative methods in managerial accounting. Financial statements and annual reports. Income measurement and income statements. Solvency analysis and profitability analysis. Introduction to cost-analysis and profit planning in transport enterprises. Management in private and public sector organizations. Financial and accounting systems in management.

TMT 712: Fundamentals of Traffic Management and Control. 3 units.

Air, Maritime, Rail and Road traffic laws and regulatory measures to improve traffic flow. Control of high-speed priorities for land public transport. Channelization and dedicated lanes, traffic signals etc. Pedestrianisation and road signs. Location of road signs, visibility distance, comprehensibility of signals and pavement signs. Networks and terminals. Vehicles, users, management and services operations. Private versus public service. Transport and land use. Components of transport industry. Transportation engineering, traffic control and enforcement. Characteristics of each of the transport modes: road transport, rail transport, air transport, shipping and inland waterways transport and pipeline transport. Prospects for other transport modes.

TMT 713: Management of Transport Enterprises. 3 units.

Introduction of management principles in private enterprises. Techniques of measuring social costs and benefits, and shadow pricing. Introduction to national income accounting and public sector economics in relation to the transport sector. Illustrative examples from all transport modes. Techniques of organization and management as applicable to transport. Management of human resources and labour relations. Aspects of financial management and marketing techniques in the promotion and selling of transport products and services. Government policies and transportation administration. Comparative case studies from public and private organizations in all transport modes.

TMT 714: Pipeline Operations and Management. 3 units.

Evolution of pipeline transport in Nigeria. Relevance of pipeline transport. Issues in pipeline transport. Pipeline vandalism and the national economy. Characteristics and

organization of pipeline and petroleum transport. Terminal and handling equipment in petroleum marketing; interface with other modes and terminals. Route determination and selection. Development and closure of lines. Methods of optimizing pipeline capacity in distribution system land-use pattern in relation to pipeline and petroleum development. Marketing and distribution of Petroleum products.

TMT 715: Maritime Operations and Management. 3 units.

Maritime transport: the economic and analytical stand points; major shipping markets. Institutional, legal and other issues in maritime transport. Optimum ship design. Finance and taxation, balance of payment effect on maritime transport. Maritime freight planning and management. Role of shipping in both developed and developing countries. Politics versus economics in shipping. Demand and supply for sea transport. The economic principles of the maritime trade and its global pattern. Costs, revenue and financial performance in shipping. Economics of ship building, scrapping and competitiveness. Economic organization of the world shipping market. Economic criteria for evaluating ship design. Maritime forecasting.

TMT 717: Air Transport Operations and Management. 3 units.

Economic and commercial aspects of Air Transport; Airline and Air transport. Airline operations and their economic regulation. Air freight operations and management. Air Transport infrastructural requirement. Environment issues in Air transport operation. Role of Air transport in the developed and developing countries. Development of Air Transport in the world and in Nigeria. High speed passenger Air Transport and freight services. The economic and commercial aspects of Air Transport. Airlines and Airport Management. Airline operation and regulation. Air freight operations and management. Air Transport infrastructural requirement. Environmental issues in Air Transport operation. Role of Air Transportation in the development of both the developed and developing countries.

TMT 799: Research Project . 6 units

Students are expected submit independent projects in a chosen area of transport under the supervision of a lecturer in the Department, or on behalf of the Department and should not exceed 20,000 words (Maximum of 150 pages) on A4 paper, double line spacing using 12 points Time New Roman.

PROFESSIONAL MASTERS (MTMT) IN TRANSPORT MANAGEMENT TECHNOLOGY DEPARTMENT

Master of Technology (M.Tech.) in Transport Management Technology Department

1. Programme Philosophy

The Master of Technology (M.Tech.) programme in Transport Management Technology is designed to train high-level manpower and technical managers who will be able to allocate and manage resources efficiently within the transport sector. The quality of life of the people and the proper functioning of the economy depend on how efficiently

the transport facilities and modes are managed. The postgraduate programmes in Transport Management Technology aim at providing opportunities to graduates and professionals in the transport sector to gain advanced technical and managerial knowledge for efficient and effective management of all the aspects of transport namely, roads, rail, water, air and pipeline transport systems.

2. Programme Objectives

The objectives of the programme are to:

- i. develop and enhance professional competence in transport infrastructural planning, air transport management, road passenger and freight management, and water transport management;
- ii. provide high-level manpower capable of fostering investigation and research in the development, management and improvement of the transport sector;
- iii. provide an opportunity for in-service postgraduate training for staff of transport institutions, organizations, firms, and agencies within and outside Nigeria;
- iv. acquaint transport professionals with recent technological advances and management techniques in the transport sector and equip them with the ability to apply the principles and theory of management in the transport sector; and
- v. expose postgraduate students to both the theoretical and practical aspects of transport studies and prepare them for advanced research in the transport sector,

3. Programme Options

- i. Air Transport Management
- ii. Land Transport Management
- iii. Maritime Transport Management

4. Programme Justification

The pivotal role of transport in the socio-economic and political development of nations cannot be gainsaid. Transport contributes immensely to wealth creation, economic growth and social development. It also promotes commerce, communication, spatial interaction and physical development. However, there is a noticeable dearth of professional transport managers to manage the abundant transport resources in the country efficiently. The Master of Technology (M.Tech) degree programme in Transport Management Technology is designed to address the problem of inadequate transport professionals in Nigeria. The postgraduate programme will produce qualified transport professionals who will occupy management positions and also engage in policy formulation and implementation in the transport sector.

5. Admission Requirements

The requirements for admission into the Master of Technology programme for Transport Management Technology consist of:

- i. B.Tech in Transport Management Technology with a minimum of Second Class Lower Division;

B.Tech/B.Eng/B.Sc Engineering Sciences/Social Sciences; B.Tech/B.Sc in Urban and Regional Planning or Geography;

- ii. B.Tech, B.Sc in Transport Studies, Social Sciences, Management Science, Environmental Science, Agricultural Sciences and other related discipline with a minimum of 3rd class degree plus a Postgraduate Diploma (Upper Credit) in Transport Management Technology.
- iii. Higher National Diploma (HND) in Transport Management Technology, Social Sciences, Engineering, Environmental Sciences, Agricultural Sciences and other related disciplines from a recognized Polytechnic with a minimum of Upper Credit, plus Postgraduate Diploma (Upper Credit) in Transport Management Technology.

6. Programme Duration

The duration of the programme shall be as follows:

- i. Full-Time: Minimum of 18 months and maximum of 24 months.

7. Requirements for the Award of Master of Technology

To be eligible for the award of the M. Tech. degree in Transport Management Technology, a candidate must have:

- i. passed all courses recommended by the Department;
- ii. successfully presented at least two seminars: proposal and progress seminars;
- iii. fulfilled all other conditions as prescribed by the Board of School of Postgraduate Studies of the University;
- iv. successfully completed and defended a research thesis in an oral examination; and completed a minimum of 66 course unit

8.. COURSE OUTLINES

FIRST YEAR FIRST SEMESTER

Course Code	Course Title	L	T	P	U
TMT 801	Transport and Development	3	0	0	3
TMT 803	Transport Elements and Modal Characteristics	3	0	0	3
TMT 805	Financial Management and Accounting	3	0	0	3
TMT 807	Transport Administration and Management	3	0	0	3
TMT 809	Transport Policy Analysis	3	0	0	3
	Total				15

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
TMT 802	Logistics and Physical Distribution Planning and Management	2	0	3	3
TMT 804	Law of Business and Carriage	3	0	0	3
TMT 806	Quantitative Techniques in Transport Studies	3	0	0	3
TMT 808	Research Methodology in Transport Studies	2	0	3	3
TMT 810	Principles of Traffic Engineering	3	0	0	3
	Total				

SECOND YEAR MARITIME TRANSPORT OPTION FIRST SEMESTER

Course Code	Course Title	L	T	P	U
TMT 841	Maritime Transport Operation and Management	2	0	3	3
TMT 843	Maritime Safety and Security	2	0	3	3
TMT 845	Maritime Law and Policy	2	0	0	2
TMT 847	Ship Financing and Policy	2	0	0	2
TMT 849	Port Operations and Administration	2	0	3	3
TMT 851	Navigation and Nautical Science	1	0	3	2
TMT 855	Ship Production Technology	1	0	3	2
	Total				

SECOND YEAR LAND TRANSPORT OPTION

Course Code	Course Title	L	T	P	U
TMT 811	Operations Research in Transport	3	0	0	3
TMT 813	Traffic Management and Control	2	0	3	3
TMT 815	Pipeline Operation and Management	2	0	3	3
TMT 817	Transport and Traffic Survey Methods	3	0	0	3
TMT 819	Urban Transportation Planning	3	0	0	3
TMT 821	Rail Transportation	2	0	3	3
	Total				18

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
TMT 848	Management of Ship Operations	2	0	0	2
TMT 818	Transport Seminar	0	0	6	2
TMT 899	Master's Thesis Research Project	0	0	36	12
	Total				16

SECOND YEAR AIR TRANSPORT OPTION

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
TMT 861	Air Transport Systems and Management	2	0	3	3
TMT 863	Air Transport and Tourism	3	0	0	3
TMT 869	Aviation Law and Policy	3	0	0	3
TMT 871	Econometric Modeling in Air Transport	3	0	0	3
TMT 873	Computer Applications in Air Transport	1	0	6	3
	TOTAL				15

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
TMT 812	Advanced Transport Economics	2	0	0	2
TMT 814	Public Transport Operation and Management	2	0	3	3
TMT 816	Land Freight Planning and Management	1	0	3	2
TMT 818	Transport Seminar	0	0	6	2
TMT 899	Master's Thesis Research Project	0	0	36	12
	Total				21

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
TMT 864	Airport Management and Administration	1	0	3	2
TMT 818	Transport Seminar	0	0	6	2
TMT 899	Master's Thesis Research Project	0	0	36	12
	Total				16

COURSE SYNOPSIS

TMT 801: Transport and Development. 3 units.

The need for transport in the society and impact of transport on the environment. Transport control and regulations. Relationship of transport to land use and the environment. Energy needs of transport. Cultural influence on modal patronage of transport in developed and developing countries. Theoretical background of transport and development; active, passive and permissive roles. Transport and generation of employment; transport and economic productions, transport and trade, transport and tourism. Transport and political and economic integration. Role of telecommunication in spatial interaction, travel behaviour and regional development.

TMT 802: Logistics and Physical Distribution Planning and Management. 3 units.

Introduction to Logistic Management with reference to the planning, organization and coordinator of material flow and storage throughout the process of production to the consumer. Basic understanding of warehousing and distribution management; system for incoming goods, security and protected storage and accessibility for outflow and delivery. Warehousing technology: mechanized picking system and computerized stock control system. Mail and Courier Services: Management and operations, mode of collection, transport and delivery. Automated handling of import and export, documentation, insurance, custom clearance and localized services.

TMT 803: Transport Elements and Modal Characteristics. 3 units.

Networks and terminals. Vehicles, users, management and services operations. Private versus public service. Transport and land use. Components of transport industry. Transportation engineering, traffic control and enforcement. Characteristics of each of the transport modes: road transport, rail transport, air transport, shipping and inland waterways transport and pipeline transport. Prospects for other transport modes. Ways and Routes;

special characteristics of the various ways and routes in different modes of transport. Factors limiting traffic capacity, traffic control systems and means of communication. Special maintenance problems associated with track, highways, runways etc. Terminals and interfaces: Planning, design and operation of terminals.

TMT 804: Law of Business and Carriage. 3 units

Law of contract in transport partnership; insurance by types and for different transport modes. Government and business. Principle of indemnity. Law of carriage in different modes of transport:

- i. Sea Transport and Marine Insurance: Good-charter parties and Bills of Lading. The preliminary voyage, loading and delivery, limitation of liability, Marine Policy warranties; General Average Loss.
- ii. Land Transport: Good-parties to contract; bailment, common and private carriers, liability at common law and under standard condition of carriage. Consigner's warranty of fitness, Terms and condition of Carriage; The carriage of luggage. CPOTIF and CMR conventions. Motor insurance: type, certificate, foreign etc.

Aviation Transport: ICAO, IATA, Aviation Insurance.

TMT 805: Financial Management and Accounting. 3 units.

Control theory in Accounting. Standard costing, marketing strategy, and performance evaluation techniques. Profitability criteria and ratios. Nature of and return on capital. Transfer pricing management of working capital in Transport. Valuation of transport businesses. Effects of taxation and other governmental policies on investment and financial decision's in the transport sector. Cost-benefit analysis of transport projects. Intra-and inter-company performance evaluation: Financing imports and exports of transport related goods.

TMT 806: Quantitative Techniques in Transport Studies. 3 units.

Introduction to advanced research methods. Application of statistical/mathematical concepts in transport planning. Analysis of point and line patterns. Mathematical modeling techniques, viz: stochastic, optimization and entropy models. Introduction to multivariate statistical analysis, factor and principal component analysis. Time series analysis and linear programming. Introduction to computer application in transport studies.

TMT 807: Transport Administration and Management. 3 units.

Techniques of organization and management as applicable to transport. Management of human resources and labour relations. Aspects of financial management and marketing techniques in the promotion and selling of transport products and services. Government policies and transportation

administration. Comparative case studies from public and private organizations in all transport modes. Principles and practice of human resource management in transport. Managers' role in transport organizations with emphasis on the work force and work environment in transport sector. Human behavior in organizations. Motivation and reward strategies, job performance, job design and leadership groups. Organizational structure in transport organization. Human capital formation.

TMT 808: Research Methodology in Transport Studies. 3 units.

Theory and practice of survey research. Formulation of research problems and justification for research in transport studies. Formulation and test of research hypothesis. Sources and importance of data for transportation planning. Survey of literature techniques, social survey methods in transportation planning: observation, interview, Questionnaire. Sampling procedures: target population, sampling frame, sample size. Data coding, analysis, storage and retrieval. Use of parametric and non-parametric statistics, specification of variables and introduction to the use of multivariate statistics. Field work on data collection and organization.

TMT 809: Transport Policy Analysis. 3 units.

Government transport policy strategies; evaluation and impact of transport policy on economic sectors of the nation. Foundation and implementation of transport policy. National planning policies and the role of transport. National transport policy; transport policy and control; shipping policy; issues in Nigerian Transport systems; objectives of the Nigerian Transport policy; issues in the formulation of a National Transport policy; Government transport policy instruments; Requirements for implementing a Transport policy; problems of National Transport policy implementation.

TMT 810: Principles of Traffic Engineering. 3 units.

Fundamentals of traffic engineering in transport. Transport network analysis, and road design. Road standards and carrying capacity (weight). Bridge construction, traffic control and automation. Roundabouts and curves, T junctions, car park designs and terminals. Traffic engineering in shipping operations, air traffic control and operations. Rail traffic signals.

TMT 811: Operations Research in Transport. 3 units

Linear programming: basic concepts, the graphical and the simplex methods. Non-linear programming: Lagrangian multipliers, Newton-Raphson method, and Kuhn-Tucker condition. Integer programming: the transportation model and scheduling models. Network analysis: shortest route, maximal flow and positive flow path. Decision theory. Forecasting: multiple regression models and time series analysis. Stochastic forecasting: Markov chain modeling in transportation. Queuing modeling and systems: arrival time and service time distribution. Applications to transportation.

TMT 812: Advanced Transport Economics. 3 units.

Definition of economics. Micro versus macroeconomic concepts. Transport demand, transport supply, transport pricing. Taxes and subsidies on transport consumer satisfaction. Illustrative examples from all modes of transport. Transport and National development; cost- benefit analysis of transport projects; financing of transport infrastructure development; economic reforms in the Nigerian transport sector; conceptual issues in private funding of public transport infrastructure development.

TMT 813: Traffic Management and Control. 3 units.

Road traffic law and regulations. Measures to improve traffic for public transport. Channelization, traffic signals, one way street, banning right turns or left turns. Elements of traffic flow; Techniques of Decoding Traffic flow, Road signs, letter designs and legibility, distance comprehensibility of signal and pavement signs. Location and operation of parking lots. Traffic volume and parking lots, safety at parks, toll collection and parking, traffic and park management. Elements of traffic principles and culture. Pedestrian education. Defensive driving principles and practices. Responsibilities of parents, teachers and passengers. Responsibilities of police and other government agencies. Road, rail, sea and air accident statistics. Traffic offence statistics. Factors in accidents costs. Accidents counter-measures and safety issues in all modes of transport.

TMT 814: Public Transport Operation and Management. 3 units.

Public transport in the global context. Role of private enterprises in public transportation. Operation and administration of public transport in developed and developing countries. Operation and administration of public transport in different modes of transport; road, rail and inland waterway. Problems of public transport in developed and developing countries. Safety measures in public transport. Development of mass transit programme in Nigeria. Operation and Managements of mass transit, problems of mass transit programme in Nigeria.

TMT 815: Pipeline Operation and Management. 3 units.

Characteristics and organization of pipeline and petroleum transport. Terminal and handling equipment in petroleum marketing; interface with other modes and terminals. Route determination and selection. Development and closure of lines. Methods of optimizing pipeline capacity in distribution system Land-use partner in relation to pipeline and petroleum development. Marketing and distribution of Petroleum products.

TMT 816: Land Freight Planning and Management. 3 units.

Characteristics of private transport system and vehicle ownership structure. Private transport interest. Vehicle

cost, maintenance and refurbishing. Freight planning. Freight management. Historical, political, operational and financial aspects of railway management. Examples drawn from developed and developing countries. Development of road transport, road/rail haulage

TMT 817: Transport and Traffic Survey Methods. 3 units

Theory and practice of survey research. Sampling and questionnaire construction. Interview, consent analysis, field work data collection and organization. Types of traffic surveys. Traffic volume counts. Quantitative estimation of traffic delays and speed by moving car –observer methods. Pedestrian traffic counts and crossing delays. Origin-destination surveys, (including journey purpose): Accident survey, screen line and cordon surveys.

TMT 818: Transport Seminar. 2 units.

Each student is expected to select a topic that deals with typical air, maritime or overland transportation problems in Nigeria for research. The research must be original, in-depth and neatly packaged for oral presentation in a transportation seminar.

TMT 819: Urban Transportation Planning. 3 units.

Historical development of transportation planning. Data inputs (from Survey), matrix building, origin-destination matrices and data analysis. Trip generation, trip distribution modal split, traffic assignment, traffic growth and forecasting. Patterns of travels, frequency, and relationship with socio-economic characteristics. Modeling techniques of travel pattern. Illustrative examples from all modes. Land use and transportation planning.

TMT 821: Rail Transportation. 3 units

Evolution of rail transport. Rail transport and national economy. Rail operations within the context of through transport. Rail traffic management and control. Railway and freight movement. Railway and passenger movement. Socio-economic and environmental issues in rail transport. Technology and rail transport. Rail operations and safety.

TMT 823: Rural Transport. 3 units

Rural transport needs. Rural transport freight characteristics. Characteristics of rural transportation schemes. Principle of market centers, complementarily between rural and urban transport networks. Transport and rural development. Rural settlement distribution and growth. Rural accessibility and mobility. Rural transport planning in developing and developed countries.

TMT 841 Maritime Transport Operation and Management. 3 units.

Maritime transport from the economic and analytical standpoints. Major shipping markets. Institutional, legal and other issues in maritime transport. Optimum ship design.

Finance and taxation. Balance of payment effects on maritime transport. Maritime freight planning and management. Role of shipping in both developed and developing countries. Components of maritime transport; the port sub-systems; Nigerian maritime trends, maritime and port relationship.

TMT 843: Maritime Safety and Security. 3 units

Emerging threats to global Maritime Trade. Threats include, increase demand; State Threats that leads to armed conflict, such as those that exist in south China sea and the strait of Hormuzi; State threats that pose little chance of armed conflict, but that threaten the expeditious transport of goods (such as traffic restriction schemes proposed in the Turkish straits and, the Indonesian straits). Non-state threats such as maritime piracy and terrorism. The role of international organizations and international law in resolving these issues.

TMT 845: Maritime Law and Policy . 3 units

Emerging threats to global Maritime Trade. Threats include, increase demand; State Threats that leads to armed conflict, such as those that exist in south China sea and the strait of Hormuzi; State threats that pose little chance of armed conflict, but that threaten the expeditious transport of goods (such as traffic restriction schemes proposed in the Turkish straits and, the Indonesian straits). Non-state threats such as maritime piracy and terrorism. The role of international organizations and international law in resolving these issues.

TMT 847: Ship Financing and Policy. 2 units.

Ship Finance and Shipping Economics. How ships have been financed in the past. The world financial system and types of finance. Financing ships with equity. Financing ships with debt. Finance for new buildings. Leasing ships. Appraising risk on shipping investment. Ship finance and shipping market dynamics. Cash flow and the art of survival. The capital cost and financial performance. The revenue calculation. Computing the cash flow.

TMT 848: Management of Ship Operations. 2 units.

The variety of documents used in shipping functions. Factors affecting freight rates for different types of shipping. Methods of freight calculation, ship board management, fleet planning, route planning, container provisioning and control. Shipping company structured management. Voyage Cost estimating. Liner shipping. Liner conference. Discussion/stabilization Agreement. World shipping council. Current major container operations. Current major liner conferences and agreements. Independent liners, Carriage Term for Conventional Shipments. Liner shipping basic freight.

TMT 849: Port Operations and Administration. 3 units.

Designs and shipboard operational requirements necessary

to make modern sea-going vessels function efficiently. Various types of cargo handling equipment and rigs. Theoretical stress evaluation and cargo gear maintenance. Cargo lifting and security arrangements. Cargo rig models, specific operations required for pushing vessels. Cruise preparation procedures and the work expectation of able bodied seamen. Bunkering voyage planning and handling. A broad coverage of the entire maritime port and terminal field. Types and functions of port. Brief historical reviews of port developments. Terminal planning cargo and container handling systems. Vessel operations. Terminal management and support operations for special handling operations.

TMT 851: Navigation and Nautical Science. 2 units.

Introduction to navigational aids and instruments. Satellite navigation. Echo sounder, e.g. Ship to ship and ship to shore. International Maritime Satellite and Tele Communication (INMRSAT), Exchange Control and Digit; Interchange Systems. Automation and Control Avoidance Subsystem. The cargo handling subsystem Computer – Aided Radar Plotting Facilities (CARPF). Basic function of CARPF. International flags and pennants. Single letter signals. The Radar System Operational Principles: Transmitter function, the Aerial function, Receiver function Display function.

TMT 855: Ship Production Technology. 2 units.

Ship layout and draughtsmanship. Principal dimensions and, coefficient of form. Ship form calculations. Integration rules and methods – trapezoidal methods, Simpson's rule. Ship hydrostatics. Principles of sterility and buoyancy. Factors influencing ship size. Role of the merchant shipbuilding and scrapping industries. Regional structure of world shipbuilding. Ship building market cycles, and economic principles. The shipbuilding production process shipbuilding cost and competitiveness. The shipbuilding industry. Vessel replacement from owner's requirement. Building procedure. Dry dock operation. Shipyard bidding/costing.

TMT 861: Air Transport Systems and Management. 3 units.

Development of Air Transport in the world and in Nigeria. High speed passenger Air Transport and freight services. The economic and commercial aspects of Air Transport. Airlines and Airport Management. Airline operation and regulation. Air freight operations and management. Air Transport infrastructural requirement. Environmental issues in Air Transport operation. Role of Air Transportation in the development of both the developed and developing countries. Techniques of organization and management as applicable to transport. The management of human resources and labour relations. Financial management and marketing techniques in the promotion and selling of transport products and services. Government policies and air transportation administration. Comparative case studies from publics and private organizations in air transport.

TMT 863: Air Transport and Tourism. 3 units.

Definition of tourism and common terms in the content, (e.g. inclusive tour, package holiday etc.). The main tourist markets and principal areas and destinations which cater for them. Historical growth of tourism; recent trends and developments in holiday and leisure travel. Demand and supply factors of tourism. Air Transport for Tourism. National, regional and local policy on tourism. Financial operation and commercial aspects of tourism. Tourism and the public interest. Transport infrastructure as basis of land, water and air pollutions in relation to air transport development. Transport and global warning. Transport and environmental degradation, vibrations, delays and visual intrusions. Environmental impacts of airport locations.

TMT 864: Airport Management and Administration. 2 units.

Airport terminal facilities management. Institutional framework for airport management. Management concepts related to transport terminal. Agencies involved in management of airports. Development of airports and impact of aircraft technological advances on planning and design of airports. Airport development planning. Airport terminal movement, ground access and vehicle parking. Airport planning and development strategy in Nigeria. The principal characteristics and organization of airports. Airports of the world; comparison of different airports. Airport management: statistics and performance indicators. Quantitative techniques in airport planning e.g. queuing etc. Airport finance and administration. Airports accounts and pricing policies. Airports coordinating: a review of coordination pattern worldwide.

TMT 869: Aviation Law and Policy. 3 units.

Legal issues in Aviation industry. Aviation security, international conventions, standards and recommended practices. Legal aspects of accidents and accident investigations. Management issues of the suppression of drug abuse and illicit trafficking in aviation. National aviation policy, computer reservation and future air navigation systems. Categories of freight traffic and types of services. Organization of trucking firm (public and private). Policy formulation and implementation; corporate planning; direction and control; regulation and taxation; marketing and commercial policies. Operating practices, routing and scheduling of vehicles, staffs and traffic. Analysis of cost of operation and cost control methods. Aircraft vehicle replacement, safety and security of vehicle and cargo.

TMT 871: Econometric Modeling in Air Transport. 3 units.

Distribution theory; discrete and continuous distributions. Characteristics of functions; positive and definitive functions. The theory of infinitely divisible distribution. The theory of stochastic processes. Structural analysis of discrete data. Probabilistic choice models and computational algorithms. Applications in Aviation.

Econometric analysis of Air transport data. Nested and non-nested models. Applications in Air Transport.

TMT 873: Computer Applications in Air Transport. 3 units.

Computer application for air transport operation and management. Statistical analysis and management of air transport data. Computer applications for research in air transport. Computer modeling in air transport. Application of computer resource for development and management of air transport operations. Computer applications in weather forecasting, and flight cancellation. Computer simulation of flights, take-off, landing etc. Laboratory demonstration and practical.

TMT 899: Master's Thesis Research Project 12 units.

Students are required to carry out independent research works in a chosen area of transport under the supervision of a lecturer in the Department. The thesis to be produced should not exceed 20,000 words (Maximum of 150 pages) on A4 paper. Students will be required to defend their thesis in an oral examination before a panel of examiners.

Ph.D TRANSPORT MANAGEMENT TECHNOLOGY

Available Options

- (a) Land Transport Management
- (b) Maritime Transport Management
- (c) Air Transport Management

Programme Philosophy

The Master of Technology (M.Tech) and the Doctor of Philosophy (Ph.D) programmes in Transport Management Technology are designed to train high-level manpower and technical managers who will be able to allocate and manage resources efficiently within the transport sector. The quality of life of the people and the proper functioning of the economy depend on how efficiently the transport facilities and modes are managed. The postgraduate programmes in Transport Management Technology aim at providing opportunities to graduates and professionals in the transport sector to gain advanced technical and managerial knowledge for efficient and effective management of all the aspects of transport, namely, roads, rail, water, air and pipeline transport systems.

Programme Justification

The pivotal role of transport in the socio-economic and political development of nations cannot be gainsaid. Transport contributes immensely to wealth creation, economic growth and social development. It also promotes commerce, communication, spatial interaction and physical development. However, there is a noticeable dearth of professional transport managers to manage the abundant transport resources in the country efficiently. The Master of Technology (M.Tech) and the Doctor of Philisophy (Ph.D) degree programmes in Transport Management Technology are designed to address the problem of inadequate transport professionals in Nigeria.

The postgraduate programmes will produce qualified transport professionals who will occupy management positions

and also engage in policy formulation and implementation in the transport sector.

Admission Requirements

The requirements for admission into Ph.D in Transport Management Technology programme consist of:

- (i) M.Tech (Transport Management Technology) degree of The Federal University of Technology, Akure with at least 3.50 on the five point CGPA scale or
- (ii) M.Tech / M.Sc degree of any other recognized institution with a CGPA of at least 3.50 on the five point CGPA scale or a weighted average of 60% and above;
- (iii) Candidates for admission into the Ph.D programme must also meet the basic University requirements.

Programme Duration

The duration of the Ph.D Programme shall be as follows:

Full-Time: a minimum of 36 months and maximum of 48 months

Part-Time: a minimum of 48 months and a maximum of 72 months

Graduation Requirements

To be eligible for the award of the Doctor of Philosophy degree in Transport Management Technology, a candidate must have:

- i. passed all courses recommended (if any) by the Department,
- ii. presented at least three seminars (proposal, progress and final);
- iii. fulfilled all other conditions as prescribed by the Board of School of Postgraduate Studies of the University; and
- iv. Successfully completed and defended a research thesis in an oral examination

Ph.D. Programme Timeline			
S/N	Activity	Time	Action by
1	Registration	As dictated by the SPGS.	Students
2	Proposal Seminar	Three weeks after the end of registration.	Students but with the approval of supervisor(s)
3	Seminar series	2 nd and 3 rd Tuesdays of every month	Students presents seminars in selected topics and those yet to present proposals and progress reports can present on any of these days.
4	Progress Seminar	12 th month after first registration.	Students but with the approval of supervisor(s)
5	Thesis Registration	By the 30 th month after registration (full time) and 42 nd month after registration (part time)	Students but with the approval of supervisor(s).
6	Oral Examination	After registration of thesis.	Students but with the approval of supervisor(s).

10. ACADEMIC STAFF

Academic staff list of the department of Transport Management Technology				
S/N	Name	Qualifications	Rank	Area of Specialization
1	Dr. K. T. Gbadamosi	Ph.D., M. Sc., FCILT	Reader	Transport Safety
2	Prof. E. E. Okoko	Ph.D., M. Urp, B. Sc.	Professor	Urban Transportation Planning&Management
3	Dr. M. S. Stephens	Ph.D. M.Sc., B. Tech., CMILT.	S/Lecturer	Transport Management

9.6 SCHOOL OF SCIENCE (SOS)

9.6.1 DEPARTMENT OF BIOCHEMISTRY (BCH)

1. RESEARCH INTERESTS

The present research activities of the department span the underlisted areas of biochemistry:

- (a) Nutritional/ Food biochemistry
- (b) Toxicology
- (c) Enzymology and protein chemistry
- (d) Membrane/Lipid biochemistry
- (e) Medical biochemistry

The research carried out has on one hand a focus on the development of new biological materials with industrial applications and also basic molecular/ cell research for teaching and curriculum development on the other

2 PROGRAMME OFFERED

- (a) Post graduate Diploma in Biochemistry.
- (b) Master of Technology, M.Tech. (Applied Biochemistry)
- (c) PhD Applied Biochemistry

3 AVAILABLE OPTIONS/SPECIALIZATION

- (a) Post graduate Diploma (PGD)
 - (i) Clinical Biochemistry
 - (ii) Applied Biochemistry
- (b) M.Tech Applied Biochemistry with specialization in
 - (i) Enzymology
 - (ii) Fermentation Biotechnology
 - (iii) Toxicology
 - (iv) Microbial Biochemistry
 - (v) Clinical Biochemistry
 - (vi) Food Biochemistry

4.0 PHILOSOPHY AND OBJECTIVES.

The primary objectives of the postgraduate Diploma in Biochemistry are to:

- (i) Enable graduates of Pure/Applied Biochemistry and Clinical Biochemistry with weak grades upgrade their knowledge, and quantity to pursue higher degree programme in Clinical or Applied Biochemistry.
- (ii) Bridge the gap between the HND, AIMLT Programmes (and equivalent) and our first degree programme so as to enable the former to pursue higher degrees in Clinical or Applied Biochemistry.
- (iii) Enable graduate in related discipline who are presently employed in food, medical, pharmaceutical and other related industries to pursue degrees in clinical or Applied Biochemistry.

5.0 ADMISSION REQUIREMENTS

Candidates seeking admission into the programme must possess any of the following:

- (i) A bachelor's degree in Clinical/Applied Biochemistry with minimum of third class degree.
- (ii) A bachelor's degree in Microbiology, Food science and Technology, Pure Biochemistry and other related discipline
- (iii) HND/FINAL Diploma (AIST/AIMLT) in chemistry/biochemistry option and any other related option with a minimum pass at credit level.

6.0 DURATION OF PROGRAMME

A postgraduate Diploma student can qualify for a PGD after a minimum of three (3) semesters (18 months).

7.0 REQUIREMENTS FOR GRADUATION

Candidates are expected to submit and pass a research project in addition to course units totalling a minimum of 30 units.

COURSE OUTLINE

- a. P.G.D. Clinical Biochemistry option

First semester:

Course Code	Course Title	L	T	P	U
BCH 720	Research Project	0	0	9	3
BCH 721	Introduction to carbohydrate Biochem.	2	1	0	3
BCH 723	Metab. of aminoacid and proteins.	2	1	0	3
BCH 725	Lipid Biochemistry	2	0	0	2
BCH 727	Intro. To Nucleic acids Biochem.	2	1	0	3
BCH 729	General Biochemistry Methods.	0	0	6	2
BCH 731	Bioenergetics Principles	2	0	0	2
Total					18

Second Semester:

Course Code	Course Title	L	T	P	U
BCH 720	Research Project	0	0	9	3
BCH 722	Introd. Enzymology & Enzymatic mtd	2	1	0	3
BCH 724	Endocrinology immunology	2	0	0	2
BCH 726	Immunology Immunochemistry.	2	1	0	3
BCH 728	Pharmacological Biochemistry	2	1	0	3
BCH 730	Blood and Tissue Chemistry	2	0	0	2
BCH 732	Seminar	2	0	0	2
Total					18

Elective

Course Code	Course Title	L	T	P	U
BCH 712	Biochemical basis for Clinical Biochemistry	2	0	0	2

(ii) Applied Biochemistry Option:**First Semester**

Course Code	Course Title	L	T	P	U
BCH 712	Biochemical basis for Clinical Biochemistry	2	0	0	2
BCH 721	Introd. To Carbon Biochem.	2	1	0	3
BCH 723	Metab. Of aminoacids & Proteins.	2	1	0	3
BCH 725	Lipid Biochemistry	2	0	0	2
BCH 727	Introd. To Nucleic acids Biochem.	2	1	0	3
BCH 729	General Biochemical Methods.	0	0	6	2
BCH 731	Bioenergetics Principles	0	0	0	2
Total					18

(ii) Applied Biochemistry Option:**First Semester**

Course Code	Course Title	L	T	P	U
BCH 712	Biochemical basis for Clinical Biochemistry	2	0	0	2
BCH 721	Introd. To Carbon Biochem.	2	1	0	3
BCH 723	Metab. Of aminoacids & Proteins.	2	1	0	3
BCH 725	Lipid Biochemistry	2	0	0	2
BCH 727	Introd. To Nucleic acids Biochem.	2	1	0	3
BCH 729	General Biochemical Methods.	0	0	6	2
BCH 731	Bioenergetics Principles	0	0	0	2
Total					18

COURSE SYNOPSIS**BCH 712 Biochemical basis for Clinical Biochemistry (1 unit)**

Collection of specimens for clinical Biochemistry, Quality control, Use of control sera. Colorimetric analysis, Beer's law.

BCH 721 Introduction to Carbohydrate Biochemistry (3 units)

Monosaccharides: action of acids and bases on monosaccharides, disaccharides and polysaccharides. Identification and analysis of monosaccharides, disaccharides and oligosaccharides, polysaccharides, glycoprotein, Glycolysis.

BCH 722 Introduction to Enzymology and Enzymatic methods in Clinical Biochemistry (3 units)

Mechanism of enzyme catalysed reactions. Introduction to Enzyme kinetics. Classification and nomenclature of enzymes. Vitamins and co-enzyme, fat and water-soluble vitamins-structure and function. Principles of enzymatic methods of analysis. Glucose oxidase, SGOT, SGPT, Urase, Alkaline phosphatase, amylase, lactate dehydrogenase.

BCH 723 Metabolism of Amino acid and Proteins (3 units)

General importance of amino acid and proteins. Essential and non-essential amino acids. Protein degradation-proteolytic hydrolysis. Amino acid composition and sequence of proteins. Degradation of amino acid for energy and gluconeogenesis. Amino acid transamination, decarboxylation, oxidative deamination. Glucogenic and ketogenic amino acids, urea cycle. Metabolism of one carbon compound. Biosynthesis of oligopeptides. Metabolic disorder. Regulation of amino acid metabolism.

BCH 724 Endocrinology (2 units)

Endocrine glands organization. Cellular communication by endocrine glands. Control of endocrine actions. Endocrine control of metabolism, water balance, reproduction, insulin action, thyroid hormones.

BCH 725 Lipid Biochemistry (2 units)

Classification of lipids- complex lipids, simple lipids. Saponifiable and non-saponifiable lipids. Fatty acid-essential and non-essential, characteristics, triglycerides, phosphoglycerides, sphingolipids, waxes. Terpenes and steroids, oxidation of fatty acids. Formation and significance of ketone bodies. An introduction to biological membranes.

BCH 726 Immunology & Immunochemistry (3 units)

Immunity non-specific defence mechanisms, Antigens acquired immunity (immune response). Antibody formation, immunoglobins. Role of thymus in immunity. Autoimmunity infection, immunity & protection, immunochemistry.

BCH 727 Introduction to Nucleic Acids Biochemistry (3 units)

Nomenclature of bases, nucleosides and nucleotides. Nucleic acids. Hydrolysis of nucleic acids. Analysis of nucleotide sequence in nucleic acids. Nucleic acid-protein complexes. Genetic role structure and replication of DNA.

BCH 728 Pharmacological Biochemistry (3 units)

Host-parasite relationships. Metabolic factors affecting chemotherapeutic agents. Mechanism of drug action. Factors affecting drug efficacy. Biochemical action of some selected drugs. Nigerian medicinal plants in the management and therapy of common ailments.

BCH 729 General Biochemistry Methods (2 units)

Laboratory course consisting of experiments in areas of interest of academic staff. The course will expose students to current biochemical equipments and methods of research. Course will also include preparation of dissertation or thesis.

BCH 730 Blood & Tissue Biochemistry (2 units)

Blood production (erythropoiesis), constituents of blood. Haemoglobin synthesis, the porphyrins etc. Blood electrolytes, acid-base balances HCO_3 . The kidney; production urine, plasma proteins, albumin, globulin, fibrinogen. Methods of analysis of plasma proteins, electrophoresis.

BCH 731 Bioenergetic Principles (2 units)

A review of the laws of thermodynamics. Free energy and free energy change. Coupled reaction. Relationship between free energy change and equilibrium constant. Exergonic and endergonic reactions. The standard free energy of the hydrolysis of ATP. Structural basis of the free energy change during hydrolysis of ATP. Oxidation-Reduction reactions. Electrode potentials and the pH electrode. Oxidative phosphorylation and the energy-coupling hypothesis. Active transport.

BCH 734 Biotechnology (3 units)

Coordination of microbial metabolism, media and air sterilisation, power requirements in fermentation vessels, instrumentation and control of fermentation processes, chemicals and fuels via fermentation, production of antibiotics, cellulose and starch hydrolysis.

BCH 736 Industrial Biochemistry (3 units)

Characteristics of industrial microorganisms; screening and strain improvement, metabolic pathways of industrial products, primary and secondary metabolites; over production of industrial fermentation processes; continuous fermentation methods. Production of industrial chemicals-alcohols, organic acids, amino acids, vitamins, antibiotics, SCP production. Enzyme production and application. Brewing-beer, wines, food fermentation, yeast fermentation, waste disposal, waste utilization.

BCH 738 Food Biochemistry (2 units)

An introduction to the determination of proximate constituent of food. Energy value of food and expenditure by mammalian, food processing, preservation and storage of traditional foods. Food poisoning, preventions and cure.

BCH 740 Enzymology (2 units)

Classification and nomenclature of enzymes. Characteristics of enzymes. Active site of enzymes. Kinetics of enzyme catalysed reactions. Effect of temperature, pH, ions, and substrate concentration on enzyme catalysed reactions. Michaelis-Menten constant, K_m , maximum velocity V_{max} and inhibitor constants K_i . Some clinical aspect of enzymology.

M.TECH APPLIED BIOCHEMISTRY**1.0 OBJECTIVES**

The primary objective of the Postgraduate programme is to train graduates to have a broad-based knowledge of Biochemistry and also at the same time to develop specialized interests in specific areas of biochemical research with applications in industry and Agriculture. Such interests include; Enzyme and Fermentation Biotechnology, Toxicology, Microbial Biochemistry, Genetic Engineering and other areas of interest to the department.

Furthermore, the broad-based nature of the training is designed to make students aware of the increasing relevance of biochemistry in producing goods and services for the benefit of mankind so as to be able to:

1. Organize and supervise quality control in brewing pharmaceutical and allied industry.
2. Help industry to develop research into specialized areas of biotechnology, such as recombinant DNA technology for strain improvement in agriculture.

The M.Tech programme will be by course work and research and is geared to the needs and background of individual students. The design of the taught courses will allow non-biochemistry graduates to benefit from the M.Tech programme.

2.0 ADMISSION REQUIREMENTS**(a) M.Tech**

Candidates seeking admission into the programme must possess any of the following:

- (i) A bachelor's degree in Clinical/Applied Biochemistry with minimum of second class lower division degree.
- (ii) A bachelor's degree in Microbiology, Food science and Technology, Chemistry, Pure Biochemistry, and other related discipline
- (iii) HND/FINAL Diploma (AIST/AIMLT in Chemistry/Biochemistry option and any other related option with a minimum pass at credit level with a postgraduate diploma (PGD) certificate.

In addition to the University's general regulations and guidelines on admission, graduates with at least Second Class Lower Division in the following related disciplines will be qualified for admission:

- (i) Biochemistry, Biotechnology
- (ii) Molecular Biology, Genetics
- (iii) Applied Microbiology
- (iv) Chemistry
- (v) Animal Science, Physiology
- (vi) Agriculture
- (vii) Pharmacy

3.0 DEGREE REQUIREMENTS:

The M.Tech degree requirements include the following:

Course Requirement: Candidates must offer the core/ compulsory courses. 30 units of study are required for graduation in the Master's programme. Full time students shall not enrol for more than 18 units. Assessment of a candidate for an M.Tech will be in four parts:

- (i) BCH 809: Advanced Laboratory Course: the performance in this course will be by continual assessment.
- (ii) Written papers on courses: compulsory courses and electives will be assessed in written papers and in any other form the department considers useful.
- (iii) Thesis: A thesis describing the original work carried out by each candidate. While studying for the degree shall be submitted according to University regulation.
- (iv) Oral Examination: After submitting the dissertation the candidates will be examined orally by a board of Examiners constituted by the school.

4.0 DURATION OF PROGRAMME

The M.Tech programme will normally last between 18-24 months for full time.

COURSE OUTLINE

First Semester:

Course Code	Course Title	L	T	P	U
BCH 801	Intermediary Metabolism	3	-	-	3
BCH 803	Protein Structure & Function	3	-	-	3
BCH 805	Gene Regulation	2	-	-	2
BCH 807	Biomembrane Structure & Function	2	-	-	2
BCH 809	Biochemical Methods	1	-	6	3
	Elective	3	-	-	3
	Total				16

Elective

Course Code	Course Title	L	T	P	U
BCH 813	Food & Nutritional Biochemistry	3	-	-	3
BCH 815	Enzyme Technology	3	-	-	3
BCH 817	Phytomedicine & Medicinal Chemistry	3	-	-	3

Second Semester:

Course Code	Course Title	L	T	P	U
BCH 802	Advanced Process Biochemistry	3	-	-	3
BCH 804	Recombinant DNA Technology	2	-	-	2
BCH 806	Functional Biochemistry	3	-	-	3
BCH 808	Recent Advances in Biotechnology	3	-	-	3
BCH 810	Seminar and Independent Study	-	-	-	2
	Elective	3	-	-	3
	total				16

Electives

BCH 812	Biochemistry of Xenobiotics	3	-	-	3
BCH 814	Fermentation Technology	3	-	-	5
BCH 816	Advanced Microbial Biochemistry	3	-	-	3

COURSE SYNOPSSES

BCH 801 Intermediary Metabolism 3 Units

Essential outlines of the metabolism of carbohydrates, lipids and proteins including the role of enzymes, coenzymes and vitamins. The tricarboxylic acid cycle, glycolysis, the phosphogluconate pathway. Aspects of abnormal metabolism of carbohydrates, fat and proteins including glycogen storage disease, ketosis and amino aciduria .Essential and non-essential amino acids, fatty acids. Nucleic acid metabolism-nature of gene, its replication, transcription and translation. The genetic code outline of protein synthesis.

BCH 802 Advanced Process Biochemistry 3 Units

A review of general metabolism pathway, control and application in industrial processes. Fermentation-alcoholic, amino acids, antibiotics and its and other secondary metabolites. Primary and secondary metabolism. Process evaluation and development. Over -production of metabolites-amino acids, taste enhancers, organism of industrial importance. Microbial production of beer, wine, bread and cheese. Microbiology production of pharmaceuticals (hormones and interferon) and industrial chemicals.

Methanogenesis mechanism and application for waste treatment. Strain improvement strategies for industrial organism-induction of mutation in micro-organism and plants for the purpose of over production .Strain selection/ development and enhancement. Gene dosage and its application in industrial process.

BCH 803 Protein structure & function 3 Units

Exploration of the relationship between sequence, structure, biophysics and function. Rational design of protein structure, activity and stability. Current methods and application of protein engineering including protein evolution, unnatural amino acids and combinatorial methods.

BCH 804 Recombinant DNA Technology 2 Units

Introduction to Recombinant DNA Technology; Constructing gene libraries; Cloning vectors; Restriction Endonucleases; Gene Probes and Hybridization; Screening Gene libraries; Application of Gene Cloning; Expression of Foreign Genes; Analysing Gene and Gene Expression; Microarrays and DNA Chips; Analysing Whole Genomes.

BCH 805 Gene Regulation 2 Units

Discussion of experimental used to purify, analyse and manipulate nucleic acids, isolate molecular clones from complex genomes, physically map genomes, analyse gene expression and perform reverse genetics. Mechanism and regulation of transcription and translation in prokaryotic and eukaryotic organism.

BCH 806 Functional Biochemistry 3 Units

Biochemistry of blood; Blood components, Biochemical behaviour of Blood cells; Biochemical function of Blood and their characterization; Blood as source of medicinal preparation. Characterization of serum components in Norm and in pathology Biochemistry of the liver: Regulatory-homeostatic function, Ureapoietic function, Bilirubin and Excretory functions Detoxifying function Disturbances of liver functions. Biochemistry of the kidney: Mechanism of Uropoiesis in various segments of Nephron; Regulatory-homeostatic function; Detoxifying function; Incretory function, characterization of urine components in Norm and in pathology.

BCH 807 Biomembrane Structure & Function 2 Units

Introduction to the structures and roles of lipids and their behaviour, liposomes, membrane proteins and kinetics, protein sorting and signal transduction. Lipid diversity, lipid aggregates, dynamics and phase behaviour of lipid aggregates, permeabilities of modern and cellular bilayers, manipulation and quantitation of ionic and PH gradients.

CH 808 Recent Advance in Biotechnology 2 Units

Introduction to the concept of Biotechnology (traditional and modern); Fermentation technology; Monoclonal antibodies technology; Biosensors; Immobilization technology; Kinetic properties and Reactor design; Bioinformatics; Protein Engineering; Vaccination & Gene Manipulation; Genetically Modified Foods; Structural Biology & Rational Drug Design; Molecular Diagnosis in Inherited Disease.

BCH 809 Biochemical Methods 3 Units

This is a practical course covering a wide range of biochemical techniques, some of which are already in use in the department. It is aimed at improving the manipulative skill of the students and familiarizing the student with a variety of preparation and analytical techniques.

BCH 810 Seminar & Independent Study 2 Units

Each students will deliver seminars on selected topics and submits a written paper on a specific subject.

BCH 812 Biochemistry of Xenobiotics 3 Units

Absorption and distribution of xenobiotics; kinetics of xenobiotics; Theories of the mechanism of drug action; ligand-receptor interaction; Drug resistances and other factors affecting drug action. Metabolism of xenobiotics; Factors affecting metabolism of xenobiotics; Drug metabolites isolation and structural identification; Biochemical mode action of pesticides; Elimination of xenobiotics; Current topics in food, environmental and industrial toxicology.

BCH 813 Food & Nutritional Biochemistry 3 Units

Food analysis- proximate, mineral, antinutrient, vitamin and antioxidant activity determination. Food processing &preparation, food preservation, food storage, food poisoning, food intoxication, food hygiene, functional food, diet therapy, nutritional status and nutrient requirements. Nutritional disorders: prevention and therapy. Recommended dietary allowances. Assessment of nutritional status Nutrient requirements in relation to physical activity ageing, and disease.

BCH 814 Fermentation Technology 3 Units

Microbial growth; primary and secondary metabolism; concept of liquid substrate fermentation and solid substrate fermentation technology; The fermentation process-the mode of operation of fermentation processes, application of fermentation-microbial biomass, microbial enzymes, transformation process, recombinant products. The genetic improvement of products formation-mutation and recombination; Brewing technology.

BCH 815 Enzymes Technology 3 Units

Introduction to Enzymology, Commercial source of enzymes; Extraction and purification of enzymes; Medical and pharmaceutical application of enzymes; Immobilization of enzymes; Uses of enzymes in agriculture and the food industry; Enzymes-based sensors; Use of enzymes in organic solvent; Synthetic enzymes; Design of enzymes assays.

**BCH 816 Advanced Microbial Biochemistry 3
Units**

Molecular architecture of the bacteria cell; Bacterial growth ; Bacterial nutrition; micro- organism in the production of food; industrial chemicals; chemotherapeutic agents and enzymes; use of bioreactors; beneficial aspects of microorganism; immobilized enzymes and cells preparation and their application; control of microorganism and food processing; Virus; lysogeny and lysis; transduction, oncogenic virus.

**BCH 817 Phytomedicine & Medicinal Chemistry
3 Units**

Introduction to chemistry, pharmacology, botanical sources, safety and efficacy issues of commonly used herbal drugs with emphasis on medicinal chemistry. General principles of medicinal chemistry and pharmacology and comprehensive survey of anti- infective and antineoplastic drugs, including agents acting on the autonomic, cardiovascular, haematopoietic, inflammatory and gastrointestinal systems.

BCH 899 Master's Thesis Research Project 12 Units

Independent research findings into selected areas/topics of interest to the academic staff. Students will be required to carry out literature survey on the topics, perform experiments and produce theses. Student will be subjected to both seminar and oral examination on the projects undertaken.

Ph.D

This is designed to train manpower for tertiary institutions. This is programme by research for a period not less than 48 months. Eligibility includes Master of science or M.Tech. in any field of biochemistry scoring at least 60% or with a G.P.A. of 3.50. The Ph.D Degree programme is open to candidates holding an M.Tech, M.Sc. or M.Phil. preferably in Biochemistry. In special cases candidates qualified in a field very closely related to or overlapping areas of biochemistry (e.g. Microbiology, Clinical Biochemistry) will be accepted. In the latter cases the candidates might be required to take supplementary courses without credit.

BCH 999 Doctoral Research Project.

The programme is by research whereby the student will come up with research proposal in any area of biochemistry. The project has to be approved by the Departmental

Postgraduate Advisory Committee, and supervised by at least two lecturers. The students will have to deliver three seminars on the proposal and the work, and write a good thesis examinable by appointed examiners.

DURATION OF PROGRAMME:

Ph.D Applied Biochemistry

A Candidates with a Masters Degree studying full-time can be awarded a Ph.D after a minimum of 36 months study. A part-time student can qualify for a Ph.D in a minimum of 48 months after a Masters Degree.

In all cases, the senate may extend as it deems fit and necessary. On application, candidates may be granted extension on the programmed duration subject to Senate's approval.

DEGREE REQUIREMENTS:

Ph.D Degree:

- (1) The Ph.D Degree shall be assessed by research work. Course work shall be required by students who have been found deficient in relevant areas, and candidates shall after completing the course work be further required to pass a qualifying examination.
- (2) A Ph.D Candidates will be expected to deliver regular seminars on current topics in biochemistry, and must submit a thesis according to University Regulations. He must also present a seminar on his research work.
- (3) A candidate registered for the Ph.D in consultation with his supervisor submit to the Department at the end of the first session a comprehensive research proposal for assessment by a committee set up by the department. This must include a revise of the present knowledge of the field of research as well as the future, trends, and research methodologies.
- (4) The candidates must at the end of the programme submit a thesis describing original work carried out while studying for the degree and written in the format specified by the postgraduate school.

A Board of Examiners according to University Regulation must thereafter examine the candidate orally. The candidates must also have presented a seminar on the completed thesis.

ACADEMIC STAFF LIST

S/NO	NAME	QUALIFICATION AND STATUS	AREA OF SPECIALIZATION
1.	PROF.G.OBOH	PHD/PROFESSOR	FOOD BIOCHEMISTRY & TOXICOLOGY
2.	PROF.A.A.AKINDAHUNSI	PHD/PROFESSOR	NUTRITIONAL BIOCHEMISTRY &TOXICOLOGY
3.	PROF.J.O. AJELE	PHD/PROFESSOR	ENZYMOLOGY
4.	PROF. O. A. DAINI	PHD/PROFESSOR	MOLECULAR BIOLOGY
5.	PROF.(MRS) M.T.OLALEYE	PHD/PROFESSOR	DRUG METABOLISM & TOXICOLOGY
6.	DR.E.O.IBUKUN	PHD/ READER	MOLECULAR BIOLOGY & LIPID BIOCHEMISTRY
7.	DR. A.C AKINMOLADUN	PHD/SENIOR LECTURER	BIOCHEMICAL & MOLECULAR TOXICOLOGY & PHARMACOLOGY
8.	DR. D.M. SANNI	PHD/SENIOR LECTURER	ENZYME BIOTECHNOLOGY
9.	DR. I.J. KADE	PHD/SENIOR LECTURER	BIOCHEMICAL TOXICOLOGY
10.	DR. S.O. SALAWU	PHD/SENIOR LECTURER	FOOD BIOCHEMISTRY & TOXICOLOGY
11.	DR. A. O. LAWAL	PHD/SENIOR LECTURER	MOLECULAR BIOLOGY
12.	DR. A.O. KOLAWOLE	PHD/SENIOR LECTURER	ENZYMOLOGY & PROTEOMICS
13.	DR. (MRS) F.M. OLAJUYIGBE	PHD/SENIOR LECTURER	ENZYMOLOGY & STRUCTURAL BIOLOGY
14.	DR. O.O. ELEKOFEHINTI	PHD/LECTURER I	COMPUTATIONAL & MOLECULAR BIOLOGY
15.	DR. A.O. ADEMILUYI	PHD/LECTURER I	FUNCTIONAL FOODS & NUTRACEUTICALS
16.	DR. S.A. ADEFEGHA	PHD/LECTURER I	FOOD BIOCHEMISTRY & TOXICOLOGY
17.	DR. (MRS) B.C. ADEDAYO	PHD/LECTURER I	FOOD BIOCHEMISTRY & TOXICOLOGY
18.	DR. A.O. ADEMOSUN	PHD /LECTURER II	FOOD BIOCHEMISTRY & TOXICOLOGY

9.6.2 DEPARTMENT OF BIOLOGY (BIO)

- (A) MASTER OF TECHNOLOGY (M.Tech)
DEGREES AVAILABLE:**
1. M.Tech. Food Storage Technology
 2. M.Tech. Environmental Biology and Public Health
 3. M.Tech. Applied Parasitology
- (iii) fulfilled all other conditions as prescribed by the Board of the School of Postgraduate Studies of the University, and
- (iv) successfully completed and defended a research thesis in an oral examination.

ADMISSION REQUIREMENTS:

In addition to the University's general regulations and guidelines on admission, graduates in the following related disciplines are qualified for admission into M.Tech:

- (i) B. Tech./B.Sc. in Biology, Botany, Zoology, Microbiology, Biochemistry, and Storage Technology or other related fields from FUTA or other reputable institutions with at least Second Class Honours (Lower Division).
- (ii) Postgraduate Diploma in the fields listed in a(i) above, with a CGPA of 3.50 on a 5-point credit scale or a minimum overall score of 60%; and
- (iii) Other general requirements as prescribed by the Board of the School of Postgraduate Studies.

DEGREE REQUIREMENTS

- i) The programme which will normally last a minimum of 18 months full time will be by course work and research.
- ii) A thesis describing the original work carried out by each candidate while studying for the degree shall be submitted according to University Regulation.
- iii) After the submission of a dissertation, the candidate will be examined orally by a Board of Examiners constituted by the School of Postgraduate Studies.
- iv) Candidates must offer and maintain a minimum of a 'B' average {50 – 69} in the score/compulsory courses. A minimum total of 30 units of study are required for graduation, excluding the research project.

PROGRAMME DURATION

The duration of the M. Tech. programme shall a minimum of 18 months on full-time.

REQUIREMENTS FOR GRADUATION

To be eligible for the award of M. Tech degree a candidate must have:

- (i) pass all the courses recommended by the Department,
- (ii) successfully presented at least two seminars, proposal and final seminars,

M.TECH FOOD STORAGE TECHNOLOGY OBJECTIVES.

The objective of the postgraduate M.Tech programme and in storage technology is to train highly skilled manpower in the area of preservation and storage of foods of plants and animal origin. Losses due to improper handling and management of agricultural products and industrial raw materials are enormous. Thus the postgraduate programme has been designed to qualify students for rewarding careers in:

- (i) Food Industries
- (ii) Brewery Industries
- (iii) Research Establishments
- (iv) Higher Education
- (v) Business and Commerce
- (vi) The Civil Service
- (vii) Apart from buttressing the undergraduate programme of B.Tech Biology (Storage Technology), graduates of other disciplines can readily benefit from postgraduate programme because of some in-built conversion courses.

COURSE OUTLINE FIRST SEMESTER

Course code	Course title	L	T	P	U
BIO 801	Advanced Storage Techniques	2	0	3	3
BIO 803	Principles of Storage Technology	2	0	3	3
BIO 805	Stored Products Entomology and vertebrate Pests	2	0	3	3
BIO 811	Storage Engineering	1	0	3	2
BIO 813	Statistical Methods and Experimental Design	3	0	3	3
	Total				14

ELECTIVES

Course Code	Course Title	L	T	P	U
BIO 807	Advanced Food Processing	2	0	3	3

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
BIO 802	Advanced Food and Storage Chemistry	2	0	3	3
BIO 804	Advanced Applied Storage Techniques	1	0	3	2
BIO 806	Posts Harvest handling of Perishable Crop	2	0	3	3
BIO 808	Biodegradation & Biodegradation	1	0	3	2
BIO 814	seminar	1	0	3	2
BIO 816	Insect Pest Management	2	0	3	3
	Total				15

ELECTIVES

Course Code	Course Title	L	T	P	U
BIO 812	Quality Control & Industrial Practices	1	0	3	2
CHE 806	Advanced Food Analysis	2	0	3	3

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
BIO 899	Master's Thesis research Project	0	0	36	12

COURSE SYNOPSSES**BIO 801 ADVANCED STORAGE TECHNIQUES 3 units**

Various techniques (traditional and modern) used for storage of diverse agricultural products with particular emphasis on durables and perishables. Principles and methods of preservation of foods, fish, wildlife products and crops, Emphasis on the understanding of agents of deterioration during storage-micro organisms, insects rodents, birds e.t.c. Control of agents of deterioration on stored products, Principles and methods of drying, Storage structures and mechanisms. Insecticides. Techniques of pest control, hazards of pesticides and safety precaution. Quality of stored products. Preservation and handling of perishables.

BIO 802 ADVANCED FOOD AND STORAGE CHEMISTRY 3units

Review of the basic techniques in Proximate Analysis of food e.g. lipid content analysis. Quality control tests in stored foods e.g. floatation, staining tests, objective and subjective tests. Organoleptic properties of foods. Food enzymes and factors affecting enzyme action. The Physiology and Chemistry of seed dormancy and sprouting in tubers.

BIO 803 PRINCIPLES OF STORAGE TECHNOLOGY 3units

Importance of storage, storage losses (types and detail assessments). Factors affecting storage, relative humidity, moisture content, temperature their measurements and relationship. Detailed studies of measuring equipment. Relationship between climate and food. Inspection methods in details. Equipment and machinery for sampling and inspection. Factor considered in quality assessment. Loss assessment methodology. Good storage practices. Legislation, grading and quality standards in storage practices. Principles and methods of packaging in general and with special reference to Nigeria.

BIO 804 ADVANCED APPLIED STORAGE TECHNIQUES 3units

This is a practical course involving laboratory work, field and industrial visits to explain the theory of Storage Techniques. It is aimed at improving the manipulative skill of the student and familiarising the student with a variety of

techniques used for food preservation and storage.

BIO 805 STORED PRODUCTS ENTOMOLOGY & VERTEBRATE PESTS 3units

Biology, Ecology and Control of insect and vertebrate pests of stored products. Morphology of insects, rodents & birds involving a description of the various external features and its importance for survival in a storage environment. Behavioural and physiological characteristics of each group. The mode of action and metabolism of pesticides in the control of pests

BIO 806 POST-HARVEST HANDLING OF PERISHABLE CROPS 3units

Perishables such as roots and tubers, fruits, vegetables, physiology of perishables in storage, causes and solutions. Harvesting, handling, processing methods, packaging, distribution, marketing and consumption of perishable crops.

BIO 808 BIODETERIORATION AND BIODEGRADATION 2units

Types of deterioration and spoilage materials, physical and chemical properties of such materials and how they are affected by activities of biodeteriogenic organisms. Measures of counter biodeteriogenic processing and their economic consequences.

BIO 811 STORAGE ENGINEERING 2units

Engineering and Agricultural processing equipment for primary processing of Agricultural products e.g. Shellers, threshers e.t.c. Crop drying and dryers. Engineering aspects of drying and crop machinery equipment for cleaning and grading of agricultural products. Storage structures, techniques and instrumentation. Power for storage machinery. Conveyors and grain handling equipment. Principles of drying, storage and food processing. Cold storage technology e.g. refrigeration, chilling, Deep freezing etc. pest control procedure, pesticides and various equipment for applying pesticides.

BIO 813 STATISTICAL METHODS AND EXPERIMENTAL DESIGN 3units

Simple techniques in experimental designs such as random sampling etc. Statistical methods involving central tendencies such as mean, median, mode etc, normal distribution, complete Block Design RCBD, Split-plot design etc.

BIO 814 SEMINARS 2units

The Seminar will be on a research interest, which will be of high quality and in line with the area of research of the candidates. A written report will be submitted by the students

BIO 816 INSECT PEST MANAGEMENT 3units

Strategies and all control methods for stored products pests including physical, mechanical, cultural, chemicals, biological, microbial, biotechnical and integrated techniques. Integrated management in tropical storage environment. Mode of action and metabolism of pesticides used in the control of pests.

BIO 899 MASTER'S THESIS RESEARCH PROJECT 12units

A research project involving an investigation on a food storage problem. The report should be written in a form of a scientific report or paper

M. TECH ENVIRONMENTAL BIOLOGY AND PUBLIC HEALTH PHILOSOPHY

There is always an interaction between man and his environment (surrounding). Man has been able to modify the environment through various means including pollution, deforestation, indiscriminate disposal of sewage, refuse, agricultural wastes and industrial wastes. These activities result in the release of poisonous substances into the environment thus bringing about an imbalance in their natural composition, as well as provide breeding sites for vectors of parasitic infections. Consequently, the environment is increasingly becoming unfit for life and the survival of living organisms including humans. Some of these substances are biodegradable while others are non-biodegradable and thus persist in the environment. There is a lot of awareness about depletion of the ozone layer and the global climate change (global warming). The nature and sources of infections and routes of their transmission in the community will be studied in these programmes. Also agents of biodegradation will be studied.

OBJECTIVES

The specific objectives of these programmes are to: (a) train highly skilled manpower in the area of environmental biology and public health, parasitology and (b) expose graduates of these programmes to ways of maintaining the environment and preventing parasitic infections/infestations for the overall improvement of the health of man and his livestock.

JUSTIFICATION FOR THE PROGRAMME

The principal goal of the M. Tech. programmes is to contribute to the capacity building of tertiary institutions by producing graduates for teaching and research in Environmental Biology and Public Health, and Applied Parasitology. The programmes are designed to equip graduates having backgrounds in the different subdisciplines of Biology with the advanced skills and knowledge required for successful management of the environment and prevention of parasitic infections/infestations, the bane of man's health and that of his livestock. Graduates of the programmes are expected to work proficiently in environmental, health and government agencies. Career opportunities for graduates of these programmes exist mainly in the environmental protection and health sectors including agencies concerned with disease prevention and control, environmental protection and impact assessment. Employment opportunities also exist in both public and private establishments concerned with Epidemiology, prevention and control of parasites of medical

and veterinary importance, waste management and pollution control.

M. TECH ENVIRONMENTAL BIOLOGY AND PUBLIC HEALTH COURSE OUTLINE

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
BIO 813	Statistical Methods and Experimental Design	2	0	3	3
BIO 821	Communicable Diseases and Vector Biology	2	0	3	3
BIO 823	Public Health and Sanitary Practices	2	0	3	3
BIO 825	Environmental Impact Assessment	2	0	3	3
BIO 827	Ecology and Environmental Mutagens	2	0	3	3
BIO 829	Global Change Biology		0	3	2
Total					17

Electives

Course Code	Course Title	L	T	P	U
BIO 831	Modern Ethnobotany	1	0	3	2
BIO 833	Medical and Forensic Entomology	2	0	3	3
CHE 821	Environmental Chemistry	2	0	3	3

SECOND SEMESTER

BIO 822	Research Methodology in Environmental Biology and Public Health	1	0	3	2
BIO 824	Environmental Modification	1	0	3	2
BIO 826	Biodiversity and Conservation	1	0	3	2
BIO 828	Biodegradation	2	0	3	3
BIO 830	Ecotoxicology	2	0	3	3
BIO 814	Seminar	0	0	6	2
Total					14

Electives

Course Code	Course Title	L	T	P	U
MET 814	Environmental Pollutants and Controls	2	0	3	3

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
BIO 899	Master's Thesis research Project	0	0	3	12

COURSE SYNOPSSES

BIO 813 STATISTICAL METHODS AND EXPERIMENTAL DESIGN (2 units)

Simple techniques in experimental design, such as random sampling, statistical methods involving central tendencies, such as mean, median, mode etc., normal distribution, regression, chi-square, mean separation, - multiple range test (Tukey test) t-test etc. CRD, RCBD, (Randomized complete Block Design), Split – plot design etc.

BIO 814 SEMINAR (2 units)

Some seminars may not be directly related to the area of research of the candidate.

BIO 821 COMMUNICABLE DISEASES AND VECTOR BIOLOGY (3 units)

Aetiology of diseases; Epidemiology; Pathology, and Biology of selected parasites, Control of Tropical diseases, and their vectors in tropical Africa. Zoonosis, nosocomial infection, medical statistics.

BIO 822 RESEARCH METHODOLOGY IN ENVIRONMENTAL BIOLOGY & PUBLIC HEALTH (2 units)

The seminar will centre on recent advances in the different aspects of environmental biology and public health, or applied parasitology. Collection and preservation of parasites and their vectors; sampling and identification methods in field surveys; care of laboratory/experimental animals; diagnostic methods in laboratory investigations; data presentation and interpretation. Chromatography, Centrifugation, isolation & identification of microorganisms; specimen preparation.

BIO 823 PUBLIC HEALTH & SANITARY PRACTICES (3 units)

Sources of infections and routes of transmission in the community, Epidemiology of Diseases, Community Health, hygiene and water sewage sanitation. Safe waste disposal practices. Hygiene and literacy. Community education and participation. Community diseases control and management; vector control, prophylaxis, vaccination and chemotherapy, inspection in food and dairy industries and general sanitary environment.

BIO 824 ENVIRONMENTAL MODIFICATION (2 units)

History, Purposes and Economic implications of Environmental modifications e.g. Agriculture, Deforestation/Afforestation, Water conservation etc. Potential problems of Environmental modifications and their solutions. Human activities and natural occurrences that results in the modification of the environment.

BIO 825 ENVIRONMENTAL IMPACT ASSESSMENTS (3units)

The nature and purpose of Environmental Impact Assessment (EIA). Origin and development of EIA. Methods of EIA. Impact prediction, evaluation and mitigation. Environmental impact conventions and legislations. EIA case studies. Project operations and environmental audit. Field work.

BIO 826 BIODIVERSITY AND CONSERVATION (2 units)

Biodiversity, meaning and scope; principles of conservation biology/sustainable use of biological resources; bioconservation methods; Critical studies in Nigerian biodiversity, conservation policies (local and global); National and International institutions associated with conservation; biodiversity conservation legislations, risk assessment in conservation biology; Global environmental changes and biodiversity.

BIO 827 ECOLOGY AND ENVIRONMENTAL MUTAGENS (3 units)

Ecology of freshwater, marine and terrestrial ecosystems; man's influence on the environment – Environmental pollution, sources and effects; and environmental degradation, green house effect, global

climate change and emerging concerns, mutagens and carcinogens, mechanism of mutagenesis, genetic risk to man and the environment, effect of pollution on microbial population.

BIO 828 BIODEGRADATION (3 units)

Survey of the agents of biodegradation – microorganisms, insects, mammals, annelids etc. The mechanisms of biodegradation – mechanical, enzymatic on materials such as xenobiotics, chemicals, petrochemicals, methane (natural gas), radio nuclides, computer diskettes, biological wastes. Sewage and industrial wastewater microbiology, biological weathering, biogeochemical cycles–nitrogen, sulphur, iron. Biogeochemistry of mercury. Environmental impact of biodegradation, bioremediation.

BIO 829.GLOBAL CHANGE BIOLOGY (2 units)

Climate change, Climate variability, Global warming - meaning Evidences of global environmental changes. Effect of climate change. Ozone depletion – causes and effects. Impact of desertification and deforestation. Climate change detection and attribution. Future climate: Future emissions and climate change. Future climate predictions, study of climate sensitivity using simplified climate models. Biodiversity loss, bio-indicators, related treaties and conventions.

BIO 830 ECOTOXICOLOGY (3 units)

Historical review of human impact on the environment; major pollutant – sulphur dioxide, nitrogen oxide and nitrate,

sewage, agricultural wastes, warfare, pesticides; toxic effects of chemical pollutants on populations, communities, and terrestrial, freshwater and marine ecosystems; mechanisms and processes whereby chemicals exert their effects on ecosystem and impact caused at population and community levels; Some specific examples of environmental toxicities e.g. DDT and its environmental impact, organophosphorous pesticides, nitrates and algal bloom etc; methods of environmental monitoring; fate, assessment and behaviour of chemicals in the environment. Determination of physico-chemical parameters in terrestrial and aquatic environments.

BIO 831 MODERN ETHNOBOTANY (2 units)

History of ethnobotanical studies (from economic botany to quantitative ethnobotany); modern approaches to ethnobotanical studies; collecting and identification of plants; ethnobotany conservation and community health care, plants of ethnobotanical importance in Nigeria.

BIO 833 MEDICAL & FORENSIC ENTOMOLOGY (3 units)

Biology, ecology and control of insect pests of medical and veterinary importance. Insects/arthropods involved in forensic entomology, - flies, beetles, mites, moths, wasps, etc. Stages of decomposition of a body, Post Mortem Intervals (PMI) and its calculations; modern techniques in forensic entomology e.g. scanning electron microscopy, potassium permanganate, etc.

BIO 899 MASTER'S THESIS RESEARCH PROJECT 12units

A research project involving an investigation on a food storage problem. The report should be written in a form of a scientific report or paper

3). M.TECH APPLIED PARASITOLOGY

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
BIO 813	Statistical Methods and Experimental Design	2	0	3	3
BIO 841	Animal Associations	2	0	3	3
BIO 843	Research Techniques in Applied Parasitology	1	0	3	2
BIO 845	Taxonomy of Parasites of Medical and veterinary importance	1	0	3	2
BIO 847	Physiology and Biochemistry of Parasites	2	0	3	3
BIO 849	The Biology of Vectors of Parasitic Diseases	1	0	3	2
APH 827	Advanced Protozoology	2	0	3	3
	Total			18	

Electives

Course Code	Course Title	L	T	P	U
BIO 821	Communicable diseases and vector biology	2	0	3	3
BIO 823	Public Health & Sanitary Practice	2	0	3	3

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
BIO 814	Seminar	0	0	6	2
BIO 842	Transmission of Tropical Parasites	2	0	3	3
APH 812	Immunology of parasitic infections	2	0	3	3
APH 832	Applied Helminthology	2	0	3	3
APH 834	Epidemiology of Parasitic Diseases	2	0	3	3
	Total				14

Electives

Course Code	Course Title	L	T	P	U
BIO 844	Macromolecular Structures and Functions	2	0	3	3

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
BIO 899	Master's Thesis research Project	0	0	36	12

COURSE SYNPOSSES

BIO 841 ANIMAL ASSOCIATIONS (3 units)

Retrospecific associations among animals (symbiology), Types of parasitism, parasites and their hosts. The effects of parasitism on parasites and host. The phenomenon of host specificity in parasitism particularly among protozoans and helminths. The species problem and the evolution of parasitism in the animal kingdom.

BIO 842 TRANSMISSION OF TROPICAL PARASITES (3 Units)

Patterns of transmission of parasites in the tropics. Factors influencing the transmission dynamics of major tropical parasites including the position of their hosts in the biome. The role of vectors in disease transmission. The roles of the behaviour of parasitic organisms and their hosts in disease transmission. The transmission of zoonotic infections.

BIO 843 RESEARCH TECHNIQUES IN APPLIED PARASITOLOGY (2 units)

Collection and preservation of parasites and their vectors; identification; sampling methods in

field and laboratory investigations. Egg counts in faecal samples; histochemical and biochemical techniques. The principles and uses of Sodium dodecylsulphate polyacrylamide gel electrophoresis (SDS-PAGE), Polymerase chain reaction (PCR), Northern blotting and Western blotting.

BIO 844 MACROMOLECULAR STRUCTURES AND FUNCTIONS (3 units)

DNA: biosynthesis is of precursors; enzymology, mechanism of replication; modification and restriction. Regulation of RNA synthesis; Repressors. Ribosome structure and function. Protein synthesis and structure in relation to function.

BIO 845 TAXONOMY OF PARASITES OF MEDICAL AND VETERINARY IMPORTANCE (2 units)

Taxonomy of parasites, rules and system of naming and classifying parasites in general. Principles of the taxonomy of protozoan, platyhelminth, nematode and arthropod parasites. Problems of the taxonomy of parasites in tropical Africa.

BIO 847 PHYSIOLOGY AND BIOCHEMISTRY OF PARASITES (3 units)

Bioenergetics, purines and pyrimidine biosynthesis, amino acid metabolism and membrane biology in parasitic protozoa and helminths. Nutritional requirements of protozoan and helminth parasites particularly cysting and non-cysting sporozoans, flagellates, platyhelminths, nematodes and cestodes. Sub cellular organization of metabolic pathways.

BIO 849 THE BIOLOGY OF VECTORS OF PARASITIC DISEASES (2 units)

Types of insect and snail vectors of parasites. The habitats, habits, life cycle and behavior of vectors in the transmission and control of diseases. Chemical, biological and ecological control of vectors. The economic importance of insect and snail vectors

BIO 899 MASTERS THESIS RESEARCH PROJECT (12 units)

A research project involving original and well researched investigations on topics related to parasitology. The report should be written in the form of a scientific report or paper

B) DOCTOR OF PHILOSOPHY (Ph.D)

All aspects of Biology with Specialization in:

- a) Ph.D Applied Entomology/Storage Entomology
- b) Ph.D Storage Microbiology
- c) Ph.D Applied Parasitology

ADMISSION REQUIREMENTS

In addition to the University's general regulations and guidelines on admission, graduates in the following related disciplines are qualified for admission into Ph.D:

- (i) M.Tech. or M.Sc. or M.Phil. Degree in Biology, Zoology, Entomology,
- (ii) Nematology/Parasitology, Microbiology, Biochemistry including candidates with a background in Storage Technology.

Candidates must have a CGPA of 3.50 on a 5-point credit scale or a minimum overall score of 60% from FUTA or other reputable institutions.

DEGREE REQUIREMENTS

- i) A candidate registered for the Ph. D must in consultation with his supervisor submit to the Department at the end of the first session a comprehensive research proposal for assessment by a committee set up by the Department.
- ii) The candidate must present at least two seminars before and an additional one on completion of the research work. A thesis describing the original work carried out and written in the format specified by the Postgraduate School must be submitted at the end of the programme.
- iii) After submission of Thesis, the candidate will be examined orally by a Board of Examiners according to the University Regulation.

DURATION OF PROGRAMME

A candidate with a Master degree studying full-time can be awarded Ph.D after a minimum of 36 months and a maximum of 48 months study. A part time student can qualify for a Ph.D in a minimum of 48 months and a maximum of 72 months.

REQUIREMENTS FOR GRADUATION

To be eligible for the award of Ph. D. in Applied Parasitology, a candidate must have:

- (i) Passed all the courses prescribed by the Department where necessary.
- (ii) Successfully presented at least three seminars; proposal, progress and final.
- (iii) Successfully completed and defended a research thesis in an oral examination.
- (iv) Fulfilled all other conditions as prescribed by the Board of the School of Postgraduate Studies of the University.

LIST OF ACADEMIC STAFF

S/N	NAME	QUALIFICATION	STATUS
1.	Prof. M.O. Ashamo	B.Sc., M.Sc. (Ilorin) Ph.D (Akure)	Professor
2.	Prof. (Mrs) O. O. Odeyemi	B.Sc, M. Sc. Ph.D (Ibadan),	Professor
3.	Prof. C.O. Adedire	B.Sc., M.Sc. (Ilorin) Ph.D (Ife)	Professor
4.	Prof. T. A. Olusi	B.Sc., (Maiduguri), M.Sc. (Ibadan), Ph.D (Jos)	Professor
5.	Prof. (Mrs) A.T. Aborisade	B.Sc., (Ilorin) M.Sc. Ph.D (Ibadan),	Professor
6.	Dr. M.O. Oniya	B.Sc., M.Sc. Ph.D (Ibadan),	Reader
7.	Dr. (Miss) O.E. Ajayi	B.Tech., M.Tech. Ph.D (Akure)	Senior Lecturer/Ag. HOH
8.	Dr. J. O. Akinneye	B.Tech., M.Tech. Ph.D (Akure)	Senior Lecturer
9.	Dr. (Mrs). B.O. Odiyi	B.Sc., M.Sc. (Ibadan) Ph.D (Benin)	Senior Lecturer
10.	Dr. J. A. Adeyemi	B.Sc., (Ilorin) Ph.D (Lafayette)	Senior Lecturer
11.	Dr. O.A. Gbaya	B.Tech., M.Tech (Akure) . Ph.D(Readings)	Lecturer I
12.	Dr.(Mrs) I. A. Simon-Oke	B.Sc., (Ado-Ekiti), M.Sc (Ibadan), Ph.D (Ado-Ekiti)	Lecturer I
13.	Dr. O.J. Afolabi.	B.Tech (Akure), M.Sc. (Zaria) Ph.D (Benin)	Lecturer I
14.	Dr. B.W. Adu	B.Sc., M.Sc. Ph.D (Ife)	Lecturer I
15.	Dr. E.O. Onagbola	B.Tech, , M. Tech., (Akure), PhD (Auburn)	Lecturer I
16.	Dr. O.M. Akomolafe	B.Tech., M.Tech , Ph.D (Akure).	Lecturer I
17.	Dr. K.L. Akinwande	B.Sc, M. Sc. (Lagos) Ph.D (Ife)	Lecturer I
18.	Dr. A.O. Alabi	B.Sc., (Ilishan-Remo) M.Sc. Ph.D (Ibadan)	Lecturer I
19.	Dr. K.D. Ileke	B.Tech., M.Tech. Ph.D (Akure)	Lecturer I
20.	Mr. A.A. Sorunbe	B.Sc., M.Sc. (Ife)	Lecturer II
21.	Dr. O.O Oladele	B.Tech., M.Tech. Ph.D (Akure)	Lecturer II
22.	Dr. (Mrs). A.C. Adeyemo	B.Tech., M.Tech. Ph.D (Akure)	Lecturer II
23.	Dr. F.A. Ologundudu	B.Sc., M.Sc. Ph.D (Ife)	Lecturer II

9.6.3 DEPARTMENT OF CHEMISTRY (CHE)

PROGRAMMES IN THE DEPARTMENT AND OPTIONS

The department offers the following programmes:

- (a) **Postgraduate Diploma (PGD) in Industrial Chemistry**
- (b) **Master of Technology (M.Tech.) with specialization in**
 - i. Analytical Chemistry
 - ii. Industrial Chemistry
 - iii. Environmental Chemistry
- (c) **Ph.D with specialization in all areas of chemistry**

POST GRADUATE DIPLOMA (PGD) IN INDUSTRIAL CHEMISTRY

The objectives of this programme are:

- (i) Enable graduates of pure and applied chemistry and other related courses particularly with weak grades to upgrade their knowledge so as to qualify to pursue higher degree programmes in industrial chemistry
- (ii) Bridge the academic gap between holders of HND qualification (and its equivalent) and first degree programme so as to enable such holders of HND pursue higher degrees in industrial chemistry.
- (iii) Provide a further training ground for employers of various chemical and allied industries in their respective specialty areas of operations

ADMISSION REQUIREMENTS AND PROGRAMME DURATION

Applicants must fall into the categories stated in the objectives above to apply for this programme. It involves two semesters course work in prescribed courses and a semester of research project.

M.TECH (ANALYTICAL, INDUSTRIAL AND ENVIRONMENTAL CHEMISTRY)

ADMISSION REQUIREMENTS AND PROGRAMME DURATION

Eligible applicants should have first or second class honours Bachelor degree in chemistry, chemical engineering, metallurgical engineering, biochemistry or any other relevant field in recognized universities.

Graduates of PGD can only be admitted for an M.Tech. programme if they have a CGPA of at least 3.50 out of 5.0. Note that an academic transcript will be required to prove this.

COURSE DURATION

The programme involves a two-semester course work in all options and one semesters of research project. It has a duration of 18-24 months full-time.

DOCTOR OF PHILOSOPHY(PHD)

This is a programme designed to train manpower for tertiary institutions, industries and research institutes. It is exclusively by research duly supervised by qualified academics.

ADMISSION REQUIREMENTS

Eligibility includes Master of Science or M.Tech. in any field of chemistry with a CGPA of 3.50. out of 5.0. Note that an academic transcript will be required to prove this. The university requires that the student must have credit passes in English language, Physics, Chemistry and Biology/Agric Science.

COURSE DURATION

The duration for this programme is usually between 36 and 48 months for full-time and between 48 and 72 months for part-time.

COURSE OUTLINE

PGD First Semester Courses

Course code	Course title	L	T	P	U
CHE 721	Inorganic chemistry	2	0	2	2
CHE 723	Organic chemistry	2	0	2	2
CHE 725	Physical chemistry	2	0	2	2
CHE 727	Spectroscopy: Theory & Applications	2	1	3	3
CHE 729	Chemical technology I	2	0	2	2
CHE 731	Environmental chemistry	2	0	0	2
CHE 733	Analytical chemistry	2	0	3	2
CHE 799	Project	0	0	9	3
Total					13

Second Semester Courses

Course code	Course title	L	T	P	U
CHE 722	Instrumentation	1	0	3	2
CHE 724	Colour chemistry	2	0	3	3
CHE 726	Polymer chemistry	2	0	3	3
CHE 728	Food chemistry and analysis	2	0	3	3
CHE 730	Chemical technology II	2	0	0	2
CHE 732	Seminar	0	0	6	2
CHE 799	Project	0	0	18	6
Total					13

M.TECH. (ANALYTICAL CHEMISTRY)
First Semester Courses

Course code	Course title	L	T	P	U
CHE 801	Classical methods of analysis	1	1	3	2
CHE 803	Separation methods of analysis	1	1	3	3
CHE 805	Electro-analytical methods	1	1	3	2
CHE 807	Quantitative spectroscopic method	1	1	3	2
CHE 809	Instrumentation	1	1	3	2
CHE 821	Environmental chemistry	2	1	6	3
	Total				14

Second Semester Courses

Course code	Course title	L	T	P	U
CHE 802	Advanced techniques in analytical chemistry	1	1	3	2
CHE 804	Water analysis	1	1	3	2
CHE 806	Advanced food analysis	2	0	3	3
CHE 808	Analysis of selected raw materials	1	1	3	2
CHE 810	Recent advances in analytical chemistry	2	0	0	2
CHE 822	Laboratory techniques	1	0	0	1
	Total				12
CHE 899	Master's thesis research project	0	0	24	12

M.TECH. (INDUSTRIAL CHEMISTRY)
First Semester Courses

Course code	Course title	L	T	P	U
CHE 803	Separation method of analysis	2	0	3	3
CHE 811	Textile technology	2	0	3	3
CHE 813	Petrochemistry	2	0	0	2
CHE 815	Unit operations	2	0	0	2
CHE 817	Physical chemistry of polymers	2	0	0	2
CHE 821	Environmental chemistry	2	0	1	2
	Total				14
CHE 899	Master's thesis research project	0	0	24	12

Second Semester Courses

Course code	Course title	L	T	P	U
CHE 806	Advanced food analysis	2	0	3	3
CHE 812	Industrial organic chemistry	2	0	3	3
CHE 814	Heterogeneous catalysis	2	0	3	3
CHE 816	Seminar	2	0	0	2
CHE 818	Advanced solvent extraction technology	2	0	0	2
	Total				13

M.TECH. (ENVIRONMENTAL CHEMISTRY)
First Semester Courses

Course code	Course title	L	T	P	U
CHE 831	Analytical technique I	2	0	3	3
CHE 833	Industrial chemical process III	2	1	0	2
CHE 835	Fuel chemistry	2	1	0	2
CHE 837	Water chemistry	2	0	3	3
CHE 839	Industrial waste management	2	1	0	2
CHE 841	Soil pollution	2	0	3	3
	Total				15

Second semester courses

Course code	Course title	L	T	P	U
CHE 832	Analytical technique II	2	0	3	3
CHE 834	Physical chemistry of atmospheric environment	2	1	0	2
CHE 836	Environmental toxicology	2	0	3	3
CHE 838	Environmental legislation & standard	2	1	0	2
CHE 840	Pollution impact of pesticides	2	1	0	2
CHE 842	Selected topics in environmental pollution	2	1	0	2
CHE 844	Environmental biology	2	1	0	2
	Total				16

Third Semester Courses

Course code	Course title	L	T	P	U
CHE 843	Seminar	0	0	0	3
CHE 845	Industrial/Field trip	0	0	3	1
CHE 899	Research project	0	0	36	12
	Total				16

COURSE SYNOPSSES
POST GRADUATE DIPLOMA(PGD)
CHE 721 Inorganic Chemistry (2 units)

Chemistry of -s, -p, -d and f-block elements; relation chemistry electronic structure, size and reactions of the elements. Energy considerations as applied to extraction elements and thermal stability of compounds with regards to inorganic reactions in solutions (aqueous and non-aqueous solvents). Type of reactions and effects of solvent. Oxidation-reduction and substitution reactions. Comparative study of the chemistry of transition elements and their compounds; lanthanides and actinides. Radiochemistry; stability and ratio of neutrons and protons; modes of decay, radioactive displacement laws and decay series.

CHE 722 Instrumentation (2 units)

Light sources: Emission from incandescent bodies, Tungsten filament, Nernst glower, Hydrogen Lamp, vapour discharge, high intensity UV sources. Line sources hollow cathode lamps,

EDT, arcs, sparks, flame and lasers. Optical material properties reflecting coatings and reflection losses. Isolation of radiation: filters, monochromators, dispersion, spectral band pass, resolution resolving power, Franhofer diffraction, Rayleigh criterion, Prisms deviation and dispersion, resolving power, diffraction gratings-grating equation. Practical: Stray light, f-number, light losses Detectors-photon, thermal barrier layer, cell photoemissive tube, PMT, thermocouple, Golay cell complete instrument designs, colorimeter spectrophotometer, UV/Visible, IR, ADS/AES, Electricity in instruments, signal and signal processing, data landing elements, complete instrument systems

CHE 723 Organic chemistry (2 units)

Aromatic chemistry: Preparation and reactions of arene derivatives; Electrophilic and nucleophilic substitution in benzene ring: carbonyl chemistry and synthetic applications; Stereochemistry: stereochemistry of organic compounds; optical isomers; compounds; mechanistic Organic chemistry of alicyclic SN1 SN2 EI E2 selected topics in natural product biosynthesis and structure determination; chemistry of selected heterocyclic compound containing (O.N.D); reactive Intermediates; formation and reaction of arynes, carbenes, nitrenes and free radicals.

CHE 724 Color Chemistry (3 units)

Historical development of both natural and sheets, material synthetic colourants: their classification and indexing. Physical basis of colouration, Molecular structure and chemical constitution and how they relate to colour formation. Principal application classes of colorant; acids, Basic, Reactives, Direct, Vat and Disperse. Brief treatment of the preparative steps involved in the synthesis of colourants and the polymers on which they are applied.

CHE 725 Physical Chemistry (2 units)

Chemical equilibria, ideal and non -ideal solutions, properties of electrolytes, Homogenous and heterogeneous catalyses.

CHE 726 Polymer Chemistry (3 units)

Review of basic polymerization processes of addition and condensation and their mechanisms. Examples of large scale industrial polymers obtained from these process, their properties and chemistry of copolymerization, kinetic composition and chemistry of copolymers. Polymerization conditions of heterogeneous and homogenous systems. Physical polymers and chemistry of polymer solutions.

CHE 727 Spectroscopy: Theory and Applications (3 units)

Quantum theory of rotation and vibration; theory of microwave; or, Raman, UV and NMR spectroscopy introduction to ESR and application of UV, IR, NMR and in chemical analysis and structural elucidation. Emphasis will be on NMR, MS, and GC -MS. High resolution NMR, ¹³C NMR and other nuclei. Nuclear over Hauser effect. Shift reagents and other new experimental methods coupling and decoupling NMR. Positive and negative ion mass

fragmentation. Chemical ionization, field -adsorption MS and application of linked -scan MS.

CHE 728 Food chemistry and Analysis (3 units)

Carbohydrates, proteins, fats and oil. Physical and chemical properties. Ripening and maturation of fruits chemical and physical changes involved. Effects of enzymes in foods. Enzymatic and non -enzymatic browning reactions. Chemistry of fermentation process in the food industry. Proximate analysis of foods with specific examples from milk, and dairy products, fruits and fruits products, oil, cereal and fast foods.

CHE 729 Chemical Technology I (2 unit)

Sources of industrial raw materials and energy, flow sheets, material and energy balance, pilot plants and scale -up chemical technology equipment, process optimization. Unit operations. Quality control and industrial safety.

CHE 730 Chemical Tech II (2 units)

The chemistry and technology of organic and inorganic industrial chemical processes. Production of polymers, adhesives, pesticides, cellulose, fibre, plastics, flavours, pharmaceutical etc. manufacture of some important inorganic chemicals such as cement ammonia, nitric acid, sulphuric acid, fertilizer, mineral processing.

CHE 731 Advance Environmental Chemistry (2 units)

Chemistry industry and needs of mankind. Characteristics of the atmosphere: - Concepts of elementary circles, sources and effect of environmental/air pollution, and rain, global warming, ozone layer depletion, photochemical smog and radiation hazards. Water pollution and control, quality parameters and area of water, effects of fertilizer, sewage and industrial effluents. Water recovery desalination and ion exchange, dealkalisation, solid wastes and their instrumental analysis of environmental chemistry as applied in industries.

CHE 732 Seminar (2 units)

Designed for critical review of current topics of chemical interest. Students are required to write a comprehensive treatise on selected studies and to present graded class seminars on them.

CHE 733 Analytical Chemistry (2 units)

Process in Analytical chemistry -sampling, dissolution and separation of samples and removal of interference - Reporting analytical results-statistical data handling and errors, accuracy and precision. Comparative table of methods of analysis -sample presentation, range sensitivity and detection limit, sample versatility, costs. Classical methods of analysis. Fundamentals complex formation techniques-Acid/bases, precipitation, complexometric, reduction/oxidation, non -aqueous titrations. Instrumental and point detectors-electrochemical, colourimetric photometric use of automatic instrument (auto titration).

CHE 799 Research Project: - 6 units

This is a 6 -unit course carried out in 3 units per each semester. It is designed to expose the students into the technique of designing and executing a research topic of relevance to the current national needs and those of the various industries that utilize the research findings of chemical and allied institutes. The project is carried out under the department who also serve in addition as adviser to the student on all matters of social and general welfare of the student.

M.TECH ANALYTICAL CHEMISTRY**CHE 801 Classical methods of Analysis - 2 units**

Reaction chemistry, chemistry of selected elements, analytical data processing, titrimetry and gravimetry. Practical analysis of mineral samples.

CHE 802- Advance Techniques in Analytical chemistry - 2 units

X-ray methods, neutron activation and radiochemical techniques, Enzymatic and kinetic methods, automated and process analyzers. Plasma spectroscopy; inductively coupled plasma (ICP), microwave plasma (MIP) and direct current plasma (DCP) emission spectroscopy.

CHE 803 -Separation methods of Analysis - 3 units

Solvent extraction, thin layer chromatography, paper chromatography, gas chromatography and liquid chromatography, ion exchange, molecular sieve. Electrophoresis.

CHE 804 Water analysis- 2 units

Quality parameters for various (industrial, agricultural and domestic) uses of water. Methods of analysis of water for various quality parameters. Water pollution control and water treatment.

CHE 805- Electro-analytical methods- 2 units

Potentiometry, voltammetry, electrogravimetry, coulometry, amperometry, polarography.

CHE 806- Advanced Food Analysis - 3 units

Food chemistry, methods of analysis of food for proximate composition parameters, vitamins, mineral additives, and food contaminant. Food quality control.

CHE 807 - Quantitative Spectroscopic methods- 2 units

Flame Spectroscopy, application of UV–Visible Spectrometry, turbidimetry, nephelometry, fluorimetry and polarimetry in quantitative analysis.

CHE 808 – Analysis of selected materials - 2 units

Methods of Analysis of different raw materials, analysis for pesticide residue. Heavy metal contaminant. Soil and geochemical analysis, e.g. characterization and analysis of clays. Air analysis.

CHE 809- Instrumentation - 2 units

Manipulations of different equipment used for chemical analysis. Glass blowing. Minor repairs of equipment.

CHE 810- Recent Advances in Analytical Chemistry - 2 units

Special topics derived from recent research works. This is seminar course that focuses on recent development in analytical chemistry.

CHE 821 - Environmental Chemistry 3 units.

Industrial effluents - Analysis of solid, liquid and gaseous materials. Management of wastes: solids, liquids and gases. Phytoremediation. Analysis and disposal of radioactive materials. Environmental impact assessment (EIA).

CHE 899- Project - 12 units

Each student will be given a research title under the supervision of a lecturer. He will be expected to submit a satisfactory thesis.

(II) M. TECH. INDUSTRIAL CHEMISTRY**CHE 803 separation Methods of Analysis 3 units**

Solvent extraction, thin layer chromatography, Paper chromatography, Gas chromatography, Liquid chromatography, Ion exchange and Molecular sieve.

CHE 806 Advanced Food Analysis 3 units

Food chemistry. Methods of analysis of food for proximate composition, parameters, vitamins, amino and fatty acid analysis. Analysis for minerals, additives and food contaminants. Food quality control.

CHE 811 Textile Technology 3 units

Textile properties and definitions. Processing of fibres into fabrics. Spinning, weaving and knitting. Mechanical and Chemical finishing of textiles. Tensile properties of textile fibres.

CHE 812 Industrial Organic Chemistry 3 units

Reactors in Industrial organic transformations. The logic of chemical Synthesis. Basis for retrosynthetic analysis. Transferred based topological, Stereo chemical, functional group and other strategies. Industrial fine and intermediate organic chemicals. Chemotherapeutic and agrochemical agents.

CHE 813 Petrochemistry 2 units

Composition of petroleum, natural gases and oil field water including their origin. Separation and characterization of crude oils. Properties of petroleum, phase behaviour, compressibility and shrinkage, flow behaviour interfacial behaviour and oil refining, reaction and engineering problems. Aspects of petrochemicals

CHE 814 Heterogeneous Catalysis 2 units

Introduction and basic concepts of Industrial heterogeneous catalysis. Absorption processes. Rate and kinetic Models of

catalyst preparation and manufacture. Physical characterization and examination of catalysts. Supported Metal catalysis. Some industrial processes and known catalyst. Experimental methods.

CHE 815 Unit operations 2 -units

Fluid mechanisms- Fluid flow phenomena, basic equations of fluid flow, agitation and mixing of liquids. Heat transfer and its application -heat transfer by conduction in Solids. Principles of heat flow in fluids; heat exchange equipment, Evaporation, mass transfer and its application -phase equilibrium, distillation, leaching and extraction, principles of diffusion, gas absorption. Operations involving particulate solids -size and reducing, crystallization, mixing of solid and pastes, mechanical separation.

CHE 821 Environmental Chemistry 3 units.

Industrial effluents - Analysis of solid, liquid and gaseous materials. Management of wastes: solids, liquids and gases. Phytoremediation. Analysis and disposal of radioactive materials. Environmental Impact assessment (EIA).

CHE 816 Seminars 2 units

A 2 -unit course of critical review of current topics of chemical interest.

CHE 817 Physical Chemistry of Polymers 2 units

Structure and properties of commercially available polymers: Plastics and elastomers, carbon chain, hetero-chain and thermosetting polymers, chemical reactions of polymers; degradation and stabilization, cross linkage, inter and intramolecular rearrangements etc. Polymer solution and properties. Some physical aspects of studying polymer structures.

CHE 818 Advanced solvent Extraction Tech. 2 units

Basic principles of solvent extraction, Interpretation and generation of equilibrium data. Flow sheet calculations for immiscible phases and partially miscible phases. Industrial solvent extraction equipment. Dissociation extraction. Reagents for metals. Industrial processes involving metals and non-metals. Economics of solvent extraction processes

CHE 821 - Environmental Chemistry -3 units.

Industrial effluents - Analysis of solid, liquid and gaseous materials. Management of wastes: solids, liquids and gases. Phytoremediation. Analysis and disposal of radioactive materials. Environmental Impact assessment (EIA).

CHE 899 Project 12 units

A 12 -unit project carried out over 2 Semesters. It is aimed at exposing the students into the technique of designing and executing a research topic of relevance to the various industries that utilize the research findings.

M. TECH ENVIRONMENTAL CHEMISTRY

CHE 831 Analytical Technique I (3 Units)

Reporting analytical results- statistical data handlings and errors, accuracy and precision. Process in Analytical Chemistry: sampling, dissolution and separation of samples and removal of interferences- Comparative table of methods of analysis -sample presentation, range, sensitivity and detection limit, sample versatility and costs_ Classical methods of analysis: Gravimetry; precipitation method, purity of precipitate, co-precipitation, conditions of precipitation, precipitation from homogeneous solution, simple gravimetric determination; Titrimetry: - Acid -bases, precipitation, complexometric, oxidation/reduction and non -aqueous titrations.

CHE 832 Analytical Technique II (2 units)

The theory, use and application techniques in the following instrumentalities: thin -layer, gas and liquid chromatography, nuclear magnetic resonance spectrometry, electron spin spectrometry, mass spectrometry, atomic./absorption/ emission spectrometry, Neutron activation analysis (NAA) polarographic techniques, infra -red and uv/visible spectrometry.

CHE 833 Industrial Chemical Process III (2 units)

Nature of the chemical industry and its role in national economy. Industrial production, uses and eventual fate of industrial products such as chlorinated hydrocarbons and organo-phosphorus insecticides, herbicides, heavy metals, manufacture and uses of fertilizers, papers and textiles. The pollution effects of industrial products. Food processing and food additives, chemical analysis of chemically -treated foods.

CHE 834 Physical Chemistry of the Atmospheric Environment (2 units)

General structure of the earth's atmosphere, the free movement of air masses and atmospheric residues, types of various pollutants. Classification and chemical nature of atmospheric pollutants. Particulate pollutants, size, ma c s and chemical composition of pollutants, kinetics of atmospheric chemical processes with specific emphasis on gaseous reactions and their mechanisms; Photochemical processes and reactions giving relevant examples involving atmospheric pollutants e.g. ozone chemistry, nitrogen circles, halogen and hydroxyl radicals, hydrocarbons and chlorofluoromethane, acid rain etc. Study of fluorescence, phosphorescence and chemiluminiscence and radiation chemistry.

CHE 835 Fuel Chemistry (2 units)

Photosynthesis as a process of conversion and storage of energy from sun into chemical energy. Products of the direct combustion of plant materials, charcoal making, plant decomposition into fossil fuels. Product of the refining and combustion of fossil fuels. Air pollution, automobiles and industrial emissions. The effect of the oxides of carbon, sulphur and nitrogen in the atmosphere. Conversion of plant materials to clean non-polluting fuels by pyrolysis and fermentation processes. Bio-gas production. Nuclear energy and

radioactive pollution. Geothermal, wind, water, solar and hydrothermal energy. The energy need of man.

CHE 836 Environmental Toxicology (3 units)

Investigation of the sources and toxicity of intermediates and toxic wastes. Principles of hazard assessment of chemicals, exposure analysis, distribution and fates of chemicals in the environment. Hazardous chemical managements; Toxicity and hazards of heavy metals, radioactive elements and organic substances. Effect, analysis, ecotoxicological tests for freshwater, marine and terrestrial environments, tests for carcinogens and mutagens; principles of risk assessment. Practicals shall focus on ecotoxicological tests.

CHE 837 Water Chemistry (3 units)

Advanced treatment of structure, properties, sources and uses of water. Water analysis and water purification techniques. The solubilities of nitrogen, phosphorus, sulphur and carbon oxides in water and the behaviour of their water solutions. Water pollution; fertilizers, detergents, heavy metals, hydrocarbon pesticides, human wastes etc. as agents of water pollution. Eutrophication. The process of bioaccumulation and bio-magnification.

CHE 838 Environmental Legislation and Standards (2 units)

Development of International Environmental Legislation. General principles of public international legislation for the protection of the environment. Development of treaties and regulations. National environmental laws and guidelines; Environmental Impact assessment (EIA), Environmental Audit Report (EAR)/ Environmental Evaluation Studies General regulations; regulation for the terrestrial environment, regulations for the marine environment, regulation for the atmospheric environments. Economics of waste management.

CHE 839 Industrial Waste Management (2 units)

Industrial effluents: Analysis of solid, liquid and gaseous materials. Management of wastes; solid, liquid and gases. Analysis and disposal of radioactive materials. Recycling of domestic and industrial waste products.

CHE 840 Pollution Impact of Pesticides (2 units).

Development of pesticides, survey of major insecticides, fungicides, herbicides and rodenticides. Formulation of pesticides, toxicity and residues of pesticides. Side-effects of pesticides; pesticides in the environment; air, water and soil.

CHE 841 Soil Pollution (3 units)

Soil pollution and degradation: causes, effects and control - pollution from mineral, salts, excessive application of fertilizers and organic manure, heavy metals, pesticides etc. Chemical

behaviour of pollutants in soils and sediments with special emphasis on heavy metals. Biological effects of heavy pollutants on phyto and zootoxicity, storage capacity of soil for waste products. Influence of soil pH, redox potentials, organic matter and clay content. Analytical methods of determining soil pollutants; soil sampling, preservation and interpretation of soil pollution indices.

CHE 842 Selected Topics in Environmental Pollution (2 units)

Noise as an environmental nuisance; Barrie principles of acoustic wave theory, measurement and evaluation of noise, sources of noise, limiting values of noise, noise reduction; sound absorption and insulation. Environmental and human health: health and diseases; major diseases:- cardiovascular diseases, cancers; diseases of the locomotor systems. Chemical exposure and health.

CHE 843 Seminar (3 units)

Resources in Environmental Chemistry: A guided library work on the retrieval and correlation of information on environmental chemistry from the current primary and reviewed literature. Discussion to cover current research activities on energy resources, waste disposal, sewage treatment, air and water pollution and any other topics of pressing concern.

CHE 844 Environmental Biology (2 units)

Practical methods for the analysis of microbial population and processes in soil, water and wastes. Major topics, indicator organisms, biodegradation, bioremediation and phytoremediation.

CHE 845 Industrial/Field Trips (1 Unit)

Students are required to visit industries with significant negative impacts on the environment, waste disposal sites, landfills and polluted sites and submit a report of their findings.

CHE 899 Research Project (12 Units)

A 12 -unit project carried out in the third semester of the programme is aimed at exposing the students into the technique of designing and executing a research topic of relevance to the manufacturing/process industries, ministry, public and private sector that can utilize such research findings

PHD WITH SPECIALIZATION IN ALL AREARS OF CHEMISTRY

CHE 999 Doctoral Research Project.

A well -designed project in an interesting subject area of any field of Chemistry will be undertaken subject to the approval of the Department and the intended supervisors.

ACADEMIC STAFF PROFILE

Name	Qualification	Status	Area of Specialization
Adetuyi A. O.	B.Tech., M.Tech, PhD (<i>Akure</i>)	Professor	Polymer, Colour and Textile Chemistry
Oshodi A. A.	B. Sc, PhD (<i>Ibadan</i>)	Professor	Physical and Food Chemistry
Popoola A. V.	B.Sc (<i>Ibadan</i>); M.Sc (<i>Zaria</i>); Ph.D(<i>Manchester</i>)	Professor	Polymer and Textile Technology
Lajide L.	B.Sc (<i>Ibadan</i>); PhD (<i>Canberra</i>)	Professor	Organic, Environmental and Medicinal Chemistry
Ajayi O. O.	B. Sc (<i>Ibadan</i>); M.Sc (<i>Zaria</i>); PhD (<i>Strathclyde</i>)	Professor	Analytical, Food and Environmental Chemistry
Amoo A. I.	B.Sc, M.Sc, (<i>Benin</i>); PhD (<i>Sokoto</i>)	Professor	Food, Analytical and Environmental Chemistry
Ayesanmi A. F.	B.Tech. M. Tech., PhD (<i>Akure</i>), Cert. Environ. Monitoring (<i>Netherlands</i>)	Professor	Analytical/Environmental Chemistry
Adeeyinwo C. E.	B.Sc (<i>Ibadan</i>); M.Sc., PhD (<i>Loughborough</i>)	Professor	Instrumentation
Okoronkwo A. E.	B. Sc, (<i>Imo State University</i>) M.Sc, PhD (<i>Tadzhikistan</i>)	Professor	Inorganic and Environmental Chemistry
Adebayo A. O.	B.Tech (<i>Akure</i>) M. Sc. (<i>Ibadan</i>) PhD (<i>Akure</i>)	Reader	Industrial and Analytical Chemistry
Ogunsuyi O. H	B.Sc (<i>Ado</i>); M.Tech, PhD (<i>Akure</i>)	Reader	Industrial, Environmental and Analytical Chemistry, Clean Energy Technology
Ojo J. O.	B.Sc (), M.Sc (<i>Ibadan</i>); Ph.D (<i>Akure</i>)	Reader	Inorganic and Analytical Chemistry
Aletor O.	B. Tech, M. Tech Ph.D (<i>Akure</i>)	Reader	Industrial and Food Chemistry
Akpambang V. O.	B. Sc. (<i>Port Harcourt</i>); M. Sc (<i>Ibadan</i>); Ph.D (<i>Akure</i>)	Senior Lecturer	Analytical and Food Chemistry
Owolabi B. J.	B.Sc. (<i>Ilorin</i>); M.Sc., PhD (<i>Ibadan</i>)	Senior Lecturer	Organic and Medicinal Chemistry
Tomori W. B.	B.Tech. (<i>Akure</i>) M. Sc. (<i>Ibadan</i>), Ph.D (<i>Akure</i>)	Senior Lecturer	Industrial/Analytical/Environmental Chemistry /Geochemistry;
Owokotomo I. A.	B.Sc, M.Sc (<i>Ilorin</i>); Ph.D (<i>Ibadan</i>)	Senior Lecturer	Organic and Medicinal Chemistry
Olasehinde F. E.	B.Sc (<i>Ife</i>), M.Sc(<i>Ibadan</i>), Ph.D (<i>Hiroshima</i>)	Senior Lecturer	Physical and Environmental Chemistry
Adebayo M. O.	B.Sc (<i>Ife</i>); M.Sc, PhD (<i>Ibadan</i>)	Senior Lecturer	Physical and Environmental Chemistry
Obaseki O. O.	B.Sc. (<i>Zaria</i>); M.Tech (<i>Akure</i>)	Lecturer I	Analytical Chemistry
Alabi O. O.	B.Tech, M.Tech (<i>Akure</i>)	Lecturer I	Industrial Chemistry
Oladele E. P.	B. Tech, M. Tech. (<i>Akure</i>); MBA (<i>Lagos</i>); Ph.D (<i>Leeds</i>)	Lecturer I	Food and Analytical Chemistry
Oluwasina O. O.	B.Sc (<i>Jos</i>); M.Tech, PhD (<i>Akure</i>)	Lecturer I	Wood products Biomaterials/Waste & Natural products beneficiation
Abata E.	B. Sc (<i>Ilorin</i>); M.Tech (<i>Akure</i>)	Lecturer I	Industrial/Environmental Chemistry
Jabar J. M.	B.Tech, M.Tech, PhD (<i>Akure</i>)	Lecturer II	Industrial/Polymer Chemistry
Adelaja O. A.	B.Tech. (<i>Akure</i>); M.Sc. (<i>Strathclyde</i>); PhD (<i>Westminster</i>)	Lecturer II	Environmental Chemistry
Odukoya J. O.	B. Tech., M.Tech. (<i>Akure</i>); PhD (<i>Cranfield</i>)	Lecturer II	Food, Environmental and Petroleum Chemistry
Ogunjobi J. K.	B. Tech., M.Tech. (<i>Akure</i>); PhD (<i>York</i>)	Lecturer II	Green & Sustainable Chemistry (Organic, Polymer, Surfactant and Energy)

9.6.4 DEPARTMENT OF COMPUTER SCIENCES (CSC)

1. PROGRAMMES OFFERED

- (a) Postgraduate Diploma (PGD)
- (b) Master of Tech. (M.Tech.)
- (c) Master of Philosophy (M.Phil.)
- (d) Doctor of Philosophy (Ph.D.)

2. AVAILABLE OPTIONS/SPECIALISATION

- (a) PGD (Computer Science)
- (b) M.Tech. (Computer Science)
- (c) M.Phil. (Computer Science)
- (d) Ph.D. (Computer Science)

3. PROGRAMMES PHILOSOPHY

a. Postgraduate Diploma in Computer Science

Exigencies and realities in technological development have placed increasing demands on the currency of information technology training vis-a-vis the necessity for continuous professional development. The postgraduate diploma in computer science programme will provide an opportunity for academic and professional advancement and education in computing and information technology discipline for: (i) holders of HND in Computer Science or related disciplines; (ii) candidates intending to pursue higher degrees but whose enabling pre-requisite academic qualifications are deficient; and (iii) candidates who are desirous to broaden their technical knowledge in order to effectively cope with increasing professional responsibilities in the places of work without necessarily leaving their jobs for full-time training programmes. Postgraduate diploma in computer science programme is also especially designed for professionals who would like to convert their career into Computer Science field. This programme is unique since it is suitable for all disciplines. It provides sufficient conceptual/theoretical knowledge, and essential practical skills in key areas of Computer Science.

b. M.Tech. (Computer Science)

The M.Tech. Computer Science degree is mainly by course work and research activities in Computer Science. In the first year of the M.Tech. programme, which consists of two semesters, students are expected to successfully complete the compulsory and/or elective courses in the programme to be eligible to start their theses in the first semester of the second year. Each course is assessed based on a written continuous assessment and a final examination at the end of the semester. Research for the M.Tech. degree programme will be independently carried out by the candidates under the supervision of members of staff of the Department. The programme is designed to extend frontiers of knowledge and making meaningful contributions to knowledge, particularly in computer science and information technology,

which are areas of intense research and application activities worldwide. Through the M.Tech. programme much needed research and leadership personnel for academics, institutions, government and industry will be produced for national and international deployment.

c. M.Phil. (Computer Science)

The M.Phil. Programme is designed to meet the research needs of the candidates with the M.Sc. degree in Computer Science. It is intended to foster the development of independent research skills to enhance their ability to proceed to the Ph.D. degree programme. The M.Phil. Computer Science degree is mainly by course work and research activities in Computer Science. Research for this degree will be independently carried out by the candidates under the supervision of members of staff of the Department. The M.Phil. Programme is designed to give more basic research opportunities and more exposure to master-level course work and seminars to the prospective candidates. The programme is also designed to extend frontiers of knowledge and making meaningful contributions to knowledge, particularly in computer science and information technology, which are areas of intense research and application activities worldwide. Through this programme much needed research and leadership personnel for academics, institutions, government and industry will be produced for national and international deployment.

d. Ph.D. (Computer Science)

The Ph.D. in Computer Science is a research degree which culminates in a unique thesis that demonstrates original and creative research. As a research-oriented degree, the Ph.D. in Computer Science prepares exceptional students for careers at the cutting edge of academia, industry and government. Students are expected to demonstrate excellence in both defining and executing a substantial research project that forms a novel contribution to the state of the art in computing. With a highly individualised programme of study, the degree provides students with depth in their chosen research area coupled with a rigorous breadth of knowledge across the discipline. The Ph.D. students also become visible members of the research community by publishing research and through oral presentations at conferences and research seminars. Upon completing the Ph.D. programme, students are able to set their own research direction, teach and advise students, and work at the forefront of cutting-edge research in academia or at an industrial laboratory.

4. PROGRAMMES OBJECTIVES

a. Postgraduate Diploma (Computer Science)

The main thrust of the postgraduate diploma programme is to develop and broaden the academic and professional base and standing of graduates with a view to pursuing fulfilling and result-oriented careers in the field of computer Science.

The specific objectives of the programme are to:

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|-------|--|-------|--|
| (i) | give opportunity for Computer Science graduates that intend to make up for deficiencies in their academic background to qualify to pursue higher degrees or the practice of computing and information technology professional; | (ii) | minimum of a Third Class degree in Computer Science or relevant disciplines; |
| (ii) | develop Computer Science graduates academically so that they can be professionally qualified and result-oriented; | (iii) | Candidates with bachelor degrees from other recognised Universities must obtain a minimum of a Third Class degree in Computer Science or relevant disciplines; |
| (iii) | provide opportunity where candidates can acquire more expertise and techniques in the practice of computing profession; | (iv) | Holders of HND in Computer Science or other relevant disciplines from recognised Polytechnics with a minimum of lower/upper credit may also be considered for admission; and |
| (iv) | create opportunity for research and development in Computer Science and | (v) | Other conditions as specified by the Board of the School of Postgraduate Studies of the University. |
| (v) | provide opportunity for professionals who would like to convert their career into Computer Science field. | | |

B. M.TECH./M.PHIL. (COMPUTER SCIENCE)

The specific objectives of the programmes are to:

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|-------|--|-------|--|
| (i) | expose candidates to current researches and methodological models particularly in the Computer Science and information technology, which are areas of intense research and application activities worldwide; | (ii) | B.Tech. in Computer Science from the Federal University of Technology, Akure, Nigeria with at least a Second Class Honours (Lower Division), or |
| (ii) | provide and promote sound practical and theoretical training in computer hardware, software and application areas, that will make the students useful in both private and public sectors of the economy; enable candidates to identify computing and information technology related problems and proffer recommendations and strategies for their solutions, and | (iii) | B.Tech. or B.Sc. in Computer Science from other reputable institutions with at least a Second Class Honours (Lower Division), or |
| (iii) | develop in candidates the mastery of appropriate skills to articulate a critical analysis of advanced studies in computer science and information technology. | | Postgraduate Diploma in Computer Science from the Federal University of Technology, Akure, Nigeria or other reputable institutions with a CGPA of not less than 3.5 on a 5-point credit scale or a minimum score of 60%. |

c. Ph.D. (Computer Science)

The objective of the Ph.D. in Computer Science programme is to educate highly qualified researchers required for the expansion of fundamental knowledge and technological innovation through research and development, as well as the needs of institutions of higher learning.

5. ADMISSION REQUIREMENTS

a. Postgraduate Diploma in Computer Science

The criteria for admission into the postgraduate diploma in Computer Science shall be as follows:

- (i) Candidates with bachelor degrees from the Federal University of Technology, Akure must obtain a

minimum of a Third Class degree in Computer Science or relevant disciplines;

Candidates with bachelor degrees from other recognised Universities must obtain a minimum of a Third Class degree in Computer Science or relevant disciplines;

Holders of HND in Computer Science or other relevant disciplines from recognised Polytechnics with a minimum of lower/upper credit may also be considered for admission; and

Other conditions as specified by the Board of the School of Postgraduate Studies of the University.

B. MASTER OF TECH. (COMPUTER SCIENCE)

The requirements for admission into the M.Tech. degree programme consist of:

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|-------|--|
| (i) | B.Tech. in Computer Science from the Federal University of Technology, Akure, Nigeria with at least a Second Class Honours (Lower Division), or |
| (ii) | B.Tech. or B.Sc. in Computer Science from other reputable institutions with at least a Second Class Honours (Lower Division), or |
| (iii) | Postgraduate Diploma in Computer Science from the Federal University of Technology, Akure, Nigeria or other reputable institutions with a CGPA of not less than 3.5 on a 5-point credit scale or a minimum score of 60%. |

C. MASTER OF PHILOSOPHY (COMPUTER SCIENCE)

The requirements for admission into the M.Phil. degree programme consist of:

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|-------|--|
| (i) | M.Tech. in Computer Science from Federal University of Technology, Akure, Nigeria with a CGPA of not less than 3.0 on a 5-point credit scale or a minimum overall score of 55%, or |
| (ii) | M.Tech. or M.Sc. in Computer Science from other institutions with a CGPA of not less than 3.0 on a 5-point credit scale or a minimum overall score of 60%. |
| (iii) | all applications for the programme shall be subjected to other School of Postgraduate Studies regulations and departmental carrying capacity. |

(b) Requirements for Transfer to Ph.D. Degree Programme

A student who enters the M.Phil. degree programme may be allowed to transfer to the Ph.D. programme if he/she makes a satisfactory progress in his/her study. Such a student will be expected to fulfil the following requirements:

- (i) candidate has completed all course work with a CGPA of not less than 3.5;

- (ii) candidate successfully presented at least two seminars; proposal and progress seminars;
- (iii) candidate prepares and submits to the School of Postgraduate Studies through the Department, a research plan considered suitable for pursuing a Ph.D. degree;
- (iv) candidate presents a detailed report of research work done up to the time and submit to the School of Postgraduate Studies any relevant published and unpublished materials (if any) that can be assessed by the Department;
- (v) candidate passes an oral transfer examination to be conducted by the School of Postgraduate Studies with the panel of examiners drawn from his/her Department on the subject of the research and related topics to the field of study; and
- (vi) fulfilled all other conditions as prescribed by the Board of School of Postgraduate Studies of the University.

D. DOCTOR OF PHILOSOPHY (COMPUTER SCIENCE)

The requirements for admission into the Ph.D. programme consist of:

- (i) M.Tech. in Computer Science from the Federal University of Technology, Akure, Nigeria with a CGPA of not less than 3.5 on a 5-point credit scale, or
- (ii) M.Tech. or M.Sc. in Computer Science from other reputable institutions with a CGPA of not less than 3.5 on a 5-point credit scale or a minimum overall score of 60%, or
- (iii) M.Phil. in Computer Science from the Federal University of Technology, Akure, Nigeria or other a recognised/reputable universities with a CGPA of not less than 3.5 on a 5-point scale credit scale or a minimum overall score of 60%.

SELECTION PROCESS

There will be a qualifying written examination for all candidates seeking admission into the postgraduate programmes in Computer Science of the University. Admission may be offered to all candidates satisfying the eligibility requirements subject to viable groups and availability of teaching facilities. Admission will be finally determined strictly by their performance in the examination.

6. DURATION OF PROGRAMME

(a) Postgraduate Diploma in Computer Science

The Postgraduate Diploma in Computer Science programme can be completed in two academic sessions (four semesters).

(b) Master of Tech. (Computer Science)

The duration of the M.Tech. programme shall be a minimum of 18 months and maximum of 24 months on a full-time basis.

(c) Master of Philosophy (Computer Science)

The duration of the M.Phil. programme shall be a minimum of 18 months and maximum of 24 months on a full-time basis.

(d) Doctor of Philosophy (Computer Science)

The duration of the Ph.D. programme shall be as follows:

- (i) Full-Time: A minimum of 36 months and maximum of 42 months
- (ii) Part-Time: A minimum of 48 months and maximum of 60 months

7. REQUIREMENTS FOR GRADUATION

a. POSTGRADUATE DIPLOMA IN COMPUTER SCIENCE

To be eligible for the award of the postgraduate diploma degree in Computer Science, a candidate must have:

- (i) passed all the courses recommended by the Department;
- (ii) fulfilled all other conditions as prescribed by the Board of the School of Postgraduate Studies of the University, and
- (iii) successfully completed and defended a research project in an oral examination by a Panel of Examiners.

B. M.TECH. COMPUTER SCIENCE

To be eligible for the award of the M.Tech. degree in Computer Science, a candidate must have:

- (i) passed all the courses recommended by the Department;
- (ii) successfully presented at least two seminars: proposal and progress seminars;
- (iii) fulfilled all other conditions as prescribed by the Board of the School of Postgraduate Studies of the University, and
- (iv) successfully completed and defended a research thesis in an oral examination by a Panel of Examiners.

C. M.PHIL. COMPUTER SCIENCE

To be eligible for the award of the M.Phil. degree in Computer Science, a candidate must have:

- (i) passed all the courses recommended by the department;
- (ii) successfully presented at least two seminars: proposal and progress seminars;
- (iii) fulfilled all other conditions as prescribed by the Board of School of Postgraduate Studies of the University, and
- (iv) successfully completed and defended a research thesis in an oral examination.

D. Ph.D. COMPUTER SCIENCE

To be eligible for the award of the Ph.D. degree in Computer Science, a candidate must have:

- (i) successfully presented at least three seminars;
- (ii) fulfilled all other conditions as prescribed by the Board of the School of Postgraduate Studies of the University, and
- (iii) successfully completed and defended a research thesis in an oral examination by a Panel of Examiners.

COURSE OUTLINE

PGD (COMPUTER SCIENCE)

First Year First Semester

Course Code	Course Title	L	T	P	U
CSC701	Computing Systems	3	0	3	3
CSC703	Digital Design	3	0	0	3
CSC705	Data Structures and Algorithms	2	0	0	3
CSC707	Systems Analysis and Design	2	0	0	3
CSC709	Optimisation Techniques	2	0	0	3
Total	15				

First Year Second Semester

Course Code	Course Title	L	T	P	U
CSC702	Software Engineering	3	0	0	3
CSC704	Computer Systems Architecture	2	0	0	3
CSC706	Advanced Microcomputing	3	0	3	3
CSC708	Computer Graphics	3	0	0	3
CSC710	Computational Algorithms and Complexities	3	0	0	3
Total					15

PGD Second Year First Semester

Course Code	Course Title	L	T	P	U
CSC721	Object-Oriented Programming	3	0	0	3
CSC723	Operating Systems	3	0	0	3
CSC725	Communications and Networks	3	0	0	3
CSC727	Computer Systems Performance Evaluation	3	0	0	3
CSC729	Technology Management and Professional Issues	3	0	0	3
Total					15

PGD Second Year Second Semester

Course Code	Course Title	L	T	P	U
CSC722	Compiler Construction	3	0	0	3
CSC724	Web Programming	3	0	0	3
CSC726	Cluster Computing	3	0	0	3
CSC728	Database Systems	3	0	0	3
CSC799	PGD Research Project	0	0	9	6
					18

M.TECH. (COMPUTER SCIENCE)

First Semester

Course Code	Course Title	L	T	P	U
CSC 801	Special Topics in Computer Science	3	0	0	3
CSC 803	Advanced Database Systems	3	0	0	3
CSC 805	Computer Systems Architecture	3	0	0	3
CSC 807	Research Methodology	2	0	0	2
CSC 809	Advanced Data Structures & Algorithms	3	0	0	3
CSC 811	Advanced Compiler Construction	3	0	0	3
CSC 813	Electronic Commerce Technologies	3	0	0	3
CSC 815	Advanced Java	3	0	0	3
CSC 817	Introduction to Quantum Computing	3	0	0	3
	TOTAL				26

Second Semester

Course Code	Course Title	L	T	P	U
CSC 802	Communications & Computer Networks	3	0	0	3
CSC 804	Advanced Operating Systems	3	0	0	3
CSC 806	Expert systems	3	0	0	3
CSC 808	Fault-Tolerant Computing	3	0	0	3
CSC 810	Digital Signal Processing	3	0	0	2
CSC 812	Advanced Software Engineering	3	0	0	3
CSC 814	Concurrent and Distributed Systems	3	0	0	3
CSC 816	Mobile and Adaptive Systems	3	0	0	3
CSC 818	Bioinformatics	3	0	0	3
CSC 820	Grid Computing	3	0	0	3
	Total				29

Not less than fifteen (15) course units shall be mounted in each semester

M.Tech. SECOND YEAR

Course Code	Course Title	L	T	P	U
CSC899	Master's Thesis Research Project	0	0	36	12

M. PHIL (COMPUTER SCIENCE)

Candidates are expected to take at least three courses each semester from the available list of courses. However, Special Topics in Computing Science and Research Methodology are compulsory courses for all candidates.

M.Phil. First Semester

Course Code	Course Title	L	T	P	U
CSC881	Special Topics in Computing	3	0	0	3
CSC 883	Research Methodology	3	0	0	3
	Elective	3	0	0	3
	Total				9
	Electives				
CSC885	Advanced Database Systems	3	0	3	3
CSC887	High Performance Architectures	3	0	3	3
CSC889	Communications and Networks	3	0	3	3
CSC891	Machine Learning	3	0	3	3
CSC897	M.Phil. Research Project	0	0	36	12

M.Phil. Second Semester

Course Code	Course Title	L	T	P	U
CSC882	Computer and Network security	3	0	3	3
CSC884	Mobile and Adaptive Systems	3	0	3	3
	Elective	3	0	0	3
	Electives				
CSC 886	e-Systems	3	0	0	3
CSC 888	Concurrent and Distributed Systems	3	0	0	3
CSC 890	Grid Computing	3	0	0	3
CSC 892	Biometrics Computing	3	0	0	3

M.Phil. Third And Fourth Semesters

Course Code	Course Title	L	T	P	U
CSC897C	M.Phil. Research Project	0	0	36	12

(D) Ph.D. (COMPUTER SCIENCE)

Course Code	Course Title	L	T	P	U
CSC999 C	Ph.D. Research Project	0	0	36	12

COURSE SYNOPSSES

a) Postgraduate Diploma in Computer Science

CSC701 – Computing Systems (3 units)

Historical background of computers; hardware and software systems; principles of programming; computer programming using any of the following programming languages: C, Pascal, Perl, Fortran or Visual Basic. It further addresses the analysis, design, programming, implementation, documentation and performance evaluation of application software in the domain of science and engineering.

CSC702 – Software engineering (3 units)

Pre-requisite – CSC701, CSC707

The techniques and methodologies of software engineering; specification modelling; requirements analysis and definition; specification; software design; quality assurance; testing; reuse; development tools and environments; object-oriented development, unified modified language.

CSC703 – Digital design(3 units)

Number systems, computer arithmetic, Boolean algebra, combinational and sequential circuits, circuit minimisation techniques, and principles of digital computing.

CSC704 – Computer systems architecture (3 units)

Pre-requisite – CSC703

Introduction to computer systems, instruction set principles, instruction-level parallelism and its dynamic exploitation, exploiting instruction-level parallelism with software, memory hierarchy design, multiprocessor and thread-level parallelism, storage systems, interconnection networks and clusters, basic and intermediate concepts of pipelining, a survey of RISC architectures for desktop, server and embedded systems.

CSC705 – Data structures and algorithms(3 units)

Elementary data structures, stacks, queues, lists, tables, trees, binary trees, search trees, heaps and priority queues, sorting, hashing and hashing techniques

CSC706 – Advanced microcomputing (3 units)

Pre-requisite – CSC701

Advanced study and use of Microsoft office productivity suite with an emphasis on database design and development; VBA programming language and VB .NET are tools studied for the development of customised solutions for business and personal needs.

CSC707 – Systems analysis and design (3 units)

Systems concepts; software development life cycle; structured top-down and bottom-up design, dataflow diagramming, entity relationship modelling; study of computer aided software engineering, I/O design and validation, file and database design; design of user interfaces; comparison of structured and object-oriented design.

CSC708 – Computer graphic (3 units)

Introduction to hardware and software techniques for the display of graphical information. 2D and 3D geometry and transformations, clipping and windowing, software systems. Interactive graphics, shading, hidden surface elimination, perspective depth. Modelling and realism.

CSC709 – Optimisation techniques (3 units)

Linear programming; transportation problems and network analysis, games and strategies; queuing theory, project scheduling, inventory programming.

CSC710 – Computational algorithms and complexities (3 units)

Basic aspects of the theory of algorithms, including divide-and-conquer, dynamic programming and greedy, several graph algorithms, randomised algorithms, and approximation algorithms, together with an introduction to undecidability, and to NP-completeness.

CSC721 – Object-oriented programming (3 units)

Basic concept of object-oriented programming (OOP); study of the features of a common OOP language such as Java, C++, and the like; exception handling; introduction to object-oriented design; implementing common data structures; application of OOP in the development of systems and application software; class libraries and frameworks.

CSC722 – Compiler construction (3 units)

Introduction to theory of computation; anatomy of a compiler; lexical analysis; syntax analysis; syntax-directed translation; semantic analysis, intermediate code generation; code generation and optimisation.

CSC723 – Operating systems (3 units)**Pre-requisite – CSC704**

Operating system concepts and structure; processes (communication and scheduling); memory management; input/output and file systems; deadlocks; protection and security; an overview of major operating systems and a case study of Windows and Unix operating systems. Introduction to distributed operating systems.

CSC724 – Web programming (3 units)**Pre-requisite – CSC701, CSC721**

Technology underlying the internet; core network protocols; programming web documents including HTML, JavaScript, PHP scripting language and MySQL relational database; dynamic web site creation using both client- and server-side techniques.

CSC725 – Communications and networks (3 units)

Introduction to digital and analogue representations and channels; bandwidth and noise; channel capacity; Nyquist, Shannon; telecommunication history; circuit switching and packet switching; multiplexing; FDM, TDM, statistical

multiplexing; virtual circuits and datagrams; Aloha, CSMA, CSMA-CD, token passing, CDMA, wireless LANs and performance analysis; errors, coding and redundancy; hamming theory and codes; CRCs, selective retransmission; overview of computer networks; the OSI and TCP/IP models; transmission medium; overview of network services and protocols, applications and security; and internetworking and the internet.

CSC726 – Cluster Computing (3 units)**Pre-requisite – CSC725**

Generic architecture of a cluster computer; system architecture: SMP, network interface and topology, network communication protocols including TCP/IP programming and low-latency protocols such as virtual interface architecture; cluster runtime support; parallel programming: shared memory programming, distributed memory programming using MPI and sockets, middleware programming such as CORBA, remote procedure call; and parallel programming and applications.

CSC727 – Computer systems performance evaluation (3 units)

Overview of techniques for measuring, improving, and tuning the performance of computer systems. Procurement, workload characterisation, measurement principles, the representation of measurement data, software and hardware monitors, capacity planning, bottleneck detection, system and program tuning, simulation and analytic models and their applications, case studies.

CSC728 – Database systems (3 units)

Database concepts: file systems and databases, and the relational database model; design concepts and implementation: entity relationship modelling; normalisation of database tables and structured query language; database design and implementation; transaction management; concurrency control; distributed database management systems; object-oriented databases; database privacy, security, failure and recovery.

CSC729 – Technology management and professional Issues (3 units)

Technological systems and organisations; characteristics of systems and organisations; professional issues; legal issues; ethical issues; risk; risk assessment and management; project management; skills of a project manager and resource planning.

CSC799 – PGD research project (6 units)

An independent or group investigation of appropriate software, hardware or communication and networks problems in computer are carried out under the supervision of a lecturer. Before registering, the student must submit a written proposal to the supervisor to review. The proposal should give a brief outline of the project, estimated schedule of completion, and computer resources needed. A formal

written report is essential and an oral presentation may also be required.

(a) M.TECH. COMPUTER SCIENCE

CSC801 – Special Topics in Computing (3 Units)

A study of the current trends and popular recent research in computer science will be the focus of this course. Apart from seminars to be given by lecturers, students are expected to do substantial readings on their own.

CSC802 – Communications and Networks (3 Units)

Channels and channel capacity, introduction to information theory, sharing network resources – telecommunications history, circuit switching and packet switching, multiplexing, FDM, TDM, statistical multiplexing, virtual circuits and datagrams, advantages and disadvantages, Sharing the medium – Aloha, CSMA (persistent and non-persistent), CSMA-CD, token passing, CDMA, Wireless LANs and simple performance analysis, Dealing with errors: errors, coding and redundancy, hamming theory and codes, CRCs, ARQ protocols, selective retransmission and flow control, Internetworking and the internet: ISPs, datagram forwarding, the DNS, IPv4, addressing and forwarding, encapsulation and address resolution, TCP and UDP, Ports and Congestion controls, Example applications, Modelling data networks: services and protocols, layered architectures, the OSI 7-layer model, Introduction to queue theory, physical media, LANs and bridging, WANs and Point-to-Point links, routing, addressing and routing in the internet, end-to-end communication in the internet and application protocols.

CSC803 – Advanced Database Systems (3 Units)

A brief introduction to database concepts: file systems and databases, and the relational database model, Design concepts and implementation, entity relationship modelling, Normalisation of database tables and structured query language, Database design and implementation. Transaction management and concurrency control, Distributed database management systems, Database privacy, security, failure and recovery. Object-oriented databases, client/server systems, the data warehouse, databases in electronic commerce, web database development and database administration.

CSC804 – Advanced Operating Systems (3 units)

History of operating systems, operating system concepts and structure. Processes (communication and scheduling), memory management, input/output and file systems and an introduction to distributed systems. Protection and security. Case studies and comparative analysis of the MS-DOS, Linux system, Windows, FreeBSD system, and Mach system.

CSC805 – Computer Systems Architecture (3 Units)

Fundamentals of computer systems, instruction set principles, instruction-level parallelism and its dynamic exploitation, exploiting instruction-level parallelism with software, memory hierarchy design, multiprocessor and thread-level

parallelism, storage systems, interconnection networks and clusters, basic and intermediate concepts of pipelining, a survey of RISC architectures for desktop, server and embedded systems.

CSC806 – Expert systems (3 Units)

The basic concept of expert system; knowledge representation schemes; knowledge acquisition; design, implementation and evaluation of knowledge-based expert system. An introduction to soft computing concept. Implementation and evaluation of neuro-fuzzy expert system.

CSC807 – Research Methodology (2 Units)

Introduction to research methods (experimental design and analysis, modelling and simulation and the likes), including research paradigms and methodologies across computer science, research question formulation, design of research approach, literature search and presentation of related work, analysis of results, verbal and written presentation skills, and research ethics. Students prepare and defend a mini-project proposal in an area of their choice.

CSC808 – Fault-tolerant computing (3 units)

Introduction and overview of fault-tolerant schemes; fault and error modelling; test generation and fault simulation; concepts in fault-tolerance; reliability/availability modelling; system level diagnosis; low level fault-tolerance: error correcting coding, byte-error detecting; high-level fault-tolerant techniques in systems: rollback, checkpointing, reconfiguration; software fault-tolerance; fault-tolerant routing; integrated hardware/software fault-tolerance.

CSC809 – Advanced data structures and algorithms (3 Units)

Review of data structures; review of mathematical preliminaries: order notation, summations, recurrences; graph exploration: connected components, bi-connected components, topological sorting, strongly-connected components; greedy algorithms: minimal spanning trees, shortest paths, scheduling; divide-and-conquer: merge sort, quick sort, median and selection sorts; lower bound for finding minimum and sorting. Parallelism, a taste of parallel algorithms, parallel algorithm complexity, models of parallel processing. NP-completeness.

CSC810 – Digital signal processing (3 Units)

Introduction; brief review of analogue and digital signal processing systems; discrete time linear time-invariant signal processing systems; design of finite impulse response digital filters; introduction to z-transforms and infinite impulse response type discrete time filters; design of infinite impulse response type digital filters using analogue filter approximations; digital processing of analogue signals and other data; introduction to the discrete Fourier transform.

CSC811 – Advanced compiler construction (3 units)

Anatomy of a compiler; lexical analysis; syntax analysis; syntax-directed translation; semantic analysis, intermediate

code generation; code generation and optimisation. Garbage collection; dynamic data structures, pointer analysis, aliasing; code scheduling, pipelining; dependence testing; loop level optimisation; superscalar optimisation; profile-driven optimisation; debugging support; incremental parsing; type inference; advanced parsing algorithms; practical attribute evaluation; function in-lining and partial evaluation.

CSC812 – Advanced Software Engineering(3 units)

Introduction to the techniques and methodologies of software engineering, specification modelling, requirements analysis and definition, specification, agile software development, software design, quality assurance, testing, development tools and environments and software engineering ethics. Dependability and security. Software reuse, component-based software engineering, distributed software engineering, service-oriented architecture, embedded software and aspect-oriented software engineering. Software management-project management, project planning, quality management, configuration management and process improvement. Modern software review techniques and technologies.

CSC813 – Electronic commerce technologies (3 Units)

Introduction; the sociology and psychology of electronic commerce: building, recognising, managing and making use of online communities in web-based environments, theories of online presence and cooperation; a guide to e-commerce in general: how to differentiate e-commerce today from e-commerce yesterday, current problems of e-commerce and interesting solutions and approaches to those problems; a guide to knowledge commerce: understanding knowledge as a commodity and as a process, and representing it in web-based environments; web architecture: structural design of e-commerce systems, client-server architecture, 2-, 3-, n-tier design, server farms, scalability, integration of legacy systems, Java beans, Enterprise Java beans and java server pages, particular problems posed by 24/7 operation and an open user community; data interchange: exchanging data over the internet, XML, style sheets, document type definition, metadata and document discovery, interchange of processes using WSDL and SOAP as examples; usability: user-interfaces design for websites, use of human computer interaction methodologies in evaluating user interfaces; electronic payments: technologies that support the processing of electronic payments, characteristics and properties of electronic payment systems; mass personalisation and the virtual customer: automation of the customer relationship, use of data to customise the web experience, cookies and their risks, rule-based filtering, implicit profiling, collaborative filtering.

CSC814 – Concurrent and distributed systems (3 units)

Process and thread management: basic process model, scheduling, critical sections and synchronisation; mutual

exclusion; concurrency: modelling concurrent activity starting with Java threads; forms of communications, architectures, means of communications – shared memory, direct communication between process; security threats, case study – Unix (fork processes, communication using signals, pipes, sockets, shared memory; distributed systems: client-server model, naming and binding, remote procedure call general principles, protection and security; Java remote method invocation.

CSC815 – Advanced Java (3 Units)

Performance and programming style: what is performance?, improving performance, programming tips and tools; persistence in Java: serialisation and Java database connectivity; common object request broker architecture, reflection and JavaBeans; Java foundation classes; remote method invocation; Java native interface; security; overview of optional packages

CSC816 – Mobile and Adaptive Systems (3 Units)

Introduction and overview, properties of wireless; PANs, LANs and WANs: Ad-hoc and infrastructure networks, physical constraints and limitations (transmission and reception), Network structures and architectures, including hand-off and mobility support at the physical/link level, Example technologies at the physical/link layers: PANS – bluetooth, LANs – IEEE802.11, HiperLAN, Basic GSM and GPRS network structures, protocol architectures, next generation wireless overview including UMTS, IMT-2000 and W-CDMA, Mobile IP, problems with routing, quality of service and security, mobile systems and power management issues, file systems. Adaptive and re-configurable systems, Mobile multimedia and its relationship to proxying, Context sensitive applications, Ubiquitous computing, Pervasive computing and Ambient networking, overlay networks and vertical hand-offs, programmable networking and applications for mobile systems, code mobility and control/signalling.

CSC817 – Introduction to quantum computing (3 Units)

The theory of quantum information and quantum computation; classical information theory, compression of quantum information, transmission of quantum information through noisy channels, quantum entanglement, quantum cryptography; classical complexity theory, quantum complexity, efficient quantum algorithms; quantum error-correcting codes, fault-tolerant quantum computation; and physical implementations of quantum computation.

CSC818 – Bioinformatics (3 Units)

Basic molecular biology: cell structure and function – cell components, different type of cell, chromosome structure and organisation, cell division; the hereditary material: DNA structure, replication and protein synthesis, structure and roles of RNA, genetic code, mechanism of protein synthesis, mutation; recombinant DNA technology; genomics and

structural genomics; bioinformatics application: biological databases; gene prediction; detecting distant homology; protein structure prediction; transcriptomics; agent-based genome analysis and drug discovery informatics.

CSC820 – Grid computing (3 Units)

The metacomputing problem: forerunner to the grid. Exploring the convergence of exploitation of high-speed networks, exploitation of architectural affinity, work on coupled multiphysics problems. Grid computing: a persistent metacomputing environment.

Digital certificates as a persistent and scalable form of authorisation, visualisation of resources, hiding of complexity of metacomputing environment from user. Role of middleware in grid computing. Necessity for abstractions in a heterogeneous environment, differing operating systems, resource management systems, programming languages. Interoperability achieved via tiered middleware architectures. Abstract modelling approach to middleware problems.

CSC899 – Master's research project (12 Units)

An independent investigation of an appropriate computing research problem is to be chosen by the student and approved by the Department. Each student works under the direction of a supervisor or group of supervisors. Before registering, the student must submit a written proposal to the supervisor(s) to review. The proposal should give a brief outline of the thesis, estimated schedule of completion, and computing resources needed. Each candidate is required to prepare a thesis, which represents the report of study, in an effectively organised and well-written form. The candidate is required to present at least two/three seminar papers before the final oral presentation. The thesis is examined in a viva voce.

(C) M.PHIL. COMPUTER SCIENCE

CSC 881 – Special topics in computing (3 Units)

A study of the current trends and popular recent research in computer science will be the focus of this course. Apart from seminars to be given by lecturers, students are expected to do substantial readings on their own.

CSC 882 – Computer and network security (3 Units)

Introduction, threats, risks and vulnerabilities, data security policies/administration, security procedural control, security models, designing secure systems, effects of hardware on security, operating systems security, network security, database security, programming language security, cryptography, distributed systems security, and information systems security.

CSC883 – Research methodology (3 Units)

Introduction to research methods (experimental design and analysis, modelling and simulation and the likes), including research paradigms and methodologies across computer science, research question formulation, design of research

approach, literature search and presentation of related work, analysis of results, verbal and written presentation skills, and research ethics. Students prepare and defend a thesis proposal or project proposal in an area of their choice.

CSC884 – Mobile and adaptive systems (3 Units)

Introduction and overview, properties of wireless; PANs, LANs and WANs: Ad-hoc and infrastructure networks, physical constraints and limitations (transmission and reception), Network structures and architectures, including hand-off and mobility support at the physical/link level, Example technologies at the physical/link layers: PANS – bluetooth, LANs – IEEE802.11, HiperLAN, Basic GSM and GPRS network structures, protocol architectures, next generation wireless overview including UMTS, IMT-2000 and W-CDMA, Mobile IP, problems with routing, quality of service and security, mobile systems and power management issues, file systems. Adaptive and re-configurable systems, Mobile multimedia and its relationship to proxying, Context sensitive applications, Ubiquitous computing, Pervasive computing and Ambient networking, overlay networks and vertical hand-offs, programmable networking and applications for mobile systems, code mobility and control/signalling.

CSC885 – Advanced database systems (3 Units)

A brief introduction to database concepts and the relational database model, Design concepts and implementation, entity relationship modelling, Normalisation of database tables and structured query language, Database design and implementation. Transaction management and concurrency control, Distributed database management systems, Database privacy, security, failure and recovery. Object-oriented databases, client/server systems, the data warehouse, databases in electronic commerce, web database development and database administration.

CSC886 – e-Systems (3 Units)

Introduction to e-systems, the sociology and psychology of electronic commerce, Theories of online presence and cooperation, a guide to e-commerce and knowledge commerce in general, Web architecture, Data interchange, Usability, Electronic payments, Mass personalisation and the virtual customer.

CSC887 – High performance architectures (3 Units)

Fundamentals of computer systems, instruction set principles, instruction-level parallelism and its dynamic exploitation, exploiting instruction-level parallelism with software, memory hierarchy design, multiprocessor and thread-level parallelism, storage systems, interconnection networks and clusters, basic and intermediate concepts of pipelining, a survey of RISC architectures for desktop, server and embedded systems.

CSC888 – Concurrent and distributed systems (3 Units)

Process and thread management: basic process model,

scheduling, critical sections and synchronisation, mutual exclusion, Concurrency: modelling concurrent activity starting with Java threads, forms of communications, architectures, means of communications – shared memory, direct communication between process, security threats, case study – Unix (fork processes, communication using signals, pipes, sockets, shared memory; distributed systems: client-server model, naming and binding, remote procedure call general principles, protection and security; Java remote method invocation.

CSC889 – Communications and networks (3 Units)

Channels and channel capacity, introduction to information theory, sharing network resources – telecommunications history, circuit switching and packet switching, multiplexing, FDM, TDM, statistical multiplexing, virtual circuits and datagrams, advantages and disadvantages, Sharing the medium – Aloha, CSMA (persistent and non-persistent), CSMA-CD, token passing, CDMA, Wireless LANs and simple performance analysis, Dealing with errors: errors, coding and redundancy, hamming theory and codes, CRCs, ARQ protocols, selective retransmission and flow control, Internetworking and the internet: ISPs, datagram forwarding, the DNS, IPv4, addressing and forwarding, encapsulation and address resolution, TCP and UDP, Ports and Congestion controls, Example applications, Modelling data networks: services and protocols, layered architectures, the OSI 7-layer model, Introduction to queue theory, physical media, LANs and bridging, WANs and Point-to-Point links, routing, addressing and routing in the internet, end-to-end communication in the internet and application protocols.

CSC890 – Grid computing (3 Units)

The metacomputing problem: forerunner to the grid. Exploring the convergence of exploitation of high-speed networks, exploitation of architectural affinity, work on coupled multiphysics problems. Grid computing: a persistent metacomputing environment. Digital certificates as a persistent and scalable form of authorisation, visualisation of resources, hiding of complexity of metacomputing environment from user. Role of middleware in grid computing. Necessity for abstractions in a heterogeneous environment, differing operating systems, resource management systems, programming languages. Interoperability achieved via tiered middleware architectures. Abstract modelling approach to middleware problems.

CSC891 – Machine learning (3 Units)

Introduction, concept learning and general-to-specific ordering, decision tree learning, supervised learning, artificial neural networks, evaluating hypotheses, Bayesian learning, instance-based learning, statistical learning methods, memory based learning, transformation based learning, inductive logic programming, support vector machine, unsupervised

learning, temporal difference learning, reinforcement learning, Explanation based learning.

CSC892 – Biometrics computing (3 Units)

Introduction to biometric process, biometric parameters, different biometric system architecture, fingerprint based biometrics, face recognition systems, iris based biometrics, speaker recognition systems using voice, retina scan based biometrics, hand scan based biometrics, comparison of different biometrics verification techniques, multimodal biometrics, biometric watermarking.

CSC897 – M.Phil. research project (12 Units)

An independent investigation of an appropriate computing research problem is to be chosen by the student and approved by the Department. Each student works under the direction of a supervisor or group of supervisors. Before registering, the student must submit a written proposal to the supervisor(s) to review. The proposal should give a brief outline of the thesis, estimated schedule of completion, and computing resources needed. Each candidate is required to prepare a thesis, which represents the report of study, in an effectively organised and well-written form. The candidate is required to present at least two seminar papers before the final oral presentation. The thesis is examined in a viva voice.

Ph.D COMPUTER SCIENCE

CSC999 – Ph.D. research project

An independent investigation of an appropriate computing research problem is to be chosen by the student and approved by the Department. Each student works under the direction of a supervisor or group of supervisors. Before registering, the student must submit a written proposal to the supervisor(s) to review. The proposal should give a brief outline of the thesis, estimated schedule of completion, and computing resources needed. Each candidate is required to prepare a thesis, which represents the report of study, in an effectively organised and well-written form. The candidate is required to present at least two seminar papers before the final oral presentation. The thesis is examined in a viva voice.

The following are the major areas of research for which the facility is available to the members of staff in the Department: soft computing; machine intelligence; database systems; software engineering; computer architecture; operating systems; networking and distributed systems; network and computer security; computer graphics; multimedia systems; data mining and warehousing among others. Candidates applying to the Ph.D. in Computer Science programme should consider these areas.

ACADEMIC STAFF LIST

S/N	Name	Qualifications	Rank	Area of specialization
1.	Prof. O. S. Adewale	B.Sc. (Ago-Iwoye), M.Tech, PhD (Akure)	Professor	Computer Networks, Softcomputing, Cloud Computing, Computer Architecture
2.	Prof. O. C. Akinyokun	B.Sc. (Ife), PhD (London)	Professor	Software Engineering, e-Learning
3.	Prof. B. K. Alese	B.Tech., M.Tech., PhD (Akure)	Professor	Information Security, Cryptography, Fault-Tolerant Computing, Computer Architecture
4.	Prof. O. Olabode	B.Tech., M.Tech., PhD (Akure)	Professor	Softcomputing, Machine Learning, e-Commerce
5.	Dr. A. O. Adetunmbi	B.Tech., M.Tech., PhD (Akure)	Reader/HOD	Information Security, Intrusion Detection, Language Processing
6.	Dr. S. A. Oluwadare	B.Sc. (Ibadan), M.Tech, PhD (Akure)	Senior Lecturer	High Performance Computing, Softcomputing
7.	Dr. Mrs. B. A. Ojokoh	B.Sc. (Ado), M.Tech, PhD (Akure)	Senior Lecturer	Web Mining, Intelligent Information Management, Digital Libraries
8.	Dr. Mrs. O. A. Daramola	B.Tech, M.Tech, PhD (Akure)	Senior Lecturer	Computer Networks
9.	Dr. Mrs. O. K. Boyinbode	B.Tech (Akure), M.Sc. (Lagos), PhD(Cape Town)	Senior Lecturer	Mobile and Ubiquitous Computing, Computer Networks
10.	Dr. Mrs. O. C. Agbonifo	B. SC(Ibadan), M.Tech, PhD(Akure)	Senior Lecturer	Ubiquitous Computing, Software Engineering
11.	Dr. O. Obe	B.Tech(Akure), M.Sc. (Lagos), PhD (Bucharest)	Senior Lecturer	Artificial Intelligence, Control, Mobile Systems
12.	Dr. Mrs. A. F. Thompson	B.Tech (Ogbomoso), M.Tech, PhD (Akure)	Senior Lecturer	Computer Network Security, Biometric Security
13.	Dr. R. O. Akinyede	B.Tech, M.Tech, PhD (Akure)	Senior Lecturer	e-Commerce, Information Security
14.	Dr. G. B. Akintola	B.Tech, M.Tech, PhD (Akure)	Senior Lecturer	Software Engineering, e-Learning
15.	Dr G. B. Iwasokun	B.Tech, M.Tech, PhD (Akure)	Senior Lecturer	Biometric Security, Image Processing
16.	Dr. M. B. Kuboye	B.Tech, M.Tech, PhD (Akure)	Senior Lecturer	Computer Networks
17.	Dr. (Mrs.) O. D. Alowolodu	B.Sc. (Ado-Ekiti), M.Tech (Akure)	Lecturer I	Cloud Computing, Computer Network Security
18.	Dr. E. O. Ibam	B.Sc, (Nzukka), M. Sc. (Zaria), PhD (Akure)	Lecturer II	Software Engineering, Softcomputing and e-Learning
19.	Dr. J. A. Gabriel	B.Sc (Sokoto), M.Tech, PhD (Akure)	Lecturer II	Computer Network Security, Cryptography
20.	Dr. O. A. Sarumi	B.Tech, M.Tech, PhD (Akure)	Lecturer II	Bioinformatics

9.6.5 DEPARTMENT OF MICROBIOLOGY (MCB)

- 1. POSTGRADUATE PROGRAMMES OFFERED:**
 - a) PGD
 - b) M. Tech.
 - c) Ph. D
- 2. AVAILABLE OPTIONS:**
 - a) **PGD**
 - i. Food and Industrial Microbiology
 - ii. Environmental Microbiology
 - iii. Medical Microbiology
 - b) **M. Tech.**
 - i. Food Microbiology
 - ii. Environmental Microbiology
 - iii. Medical Microbiology
 - c) **Ph. D**
 - i. Food Microbiology
 - ii. Environmental Microbiology
 - iii. Medical Microbiology
- 3. PHILOSOPHY AND OBJECTIVES:**
 - a) **PGD:**

The objectives of the programme are to:

 - i. serve as a bridge to take care of deficiencies in microbiology courses of HND graduates and other relevant disciplines
 - ii. train graduates in other relevant fields, the rudiments of microbiology, which will satisfy the manpower needs of industries, Hospitals and other relevant institutions
 - b) **M. Tech:**

The objective of the M. Tech. Programme in Microbiology is to train first degree graduates of this University and elsewhere on the principles of:

 - i. Food Microbiology: To assess the microbial composition, spoilage and preservation of foods, food sanitation, detection of food-borne pathogens that cause infections.
 - ii. Environmental Microbiology: Microbial activities in the environment, consequences of their activities on man and animals and how their activities can be controlled or managed and harnessed.
- iii. Medical Microbiology: Microbial infections, etiology, epidemiology, pathogenesis, antimicrobial chemotherapy and antimicrobial resistance, infection and immunity.**
- c) Ph. D:**

The objective of the Ph. D. Programme in Microbiology is to train M. Tech. (or its equivalent) graduates of this University and elsewhere to specialize in any area of Microbiology.

4. ADMISSION REQUIREMENTS:

- a) **PGD**

The following categories of candidates can be admitted into the PGD Microbiology

 - i. Third class graduates of Microbiology
 - ii. Graduates of other relevant disciplines
 - iii. HND in relevant discipline with minimum of lower credit

b) M. Tech.

In addition to the University's general regulations and guidelines on Postgraduate admission, graduates of Microbiology and Graduates of Botany, Biology, Biochemistry, Agricultural Biology, Food Science and Technology, Molecular Biology and Biotechnology who have done PGD in Microbiology with a CGPA of 3.50 may be considered for admission.

c) Ph. D

In addition to the University's general regulations and guidelines on Postgraduate admission, graduates with minimum CGPA of 3.50 or 60% at Master's level in Microbiology are considered for admission to Ph.D. degree programme.

5. DURATION

- a) **PGD**

Full Time: 24 months/4 semesters
- b) **M. Tech**

See the regulation of the University on this.
- c) **Ph. D**

See the regulation of the University on this

6. REQUIREMENT FOR GRADUATION:

- a) **PGD**

For PGD Microbiology (Food and industrial Microbiology option), candidates must register for a minimum of sixty (60) course units and six (6) units of independent project.
- b) **M. Tech**

- i. A dissertation of original research work is expected to be carried out and submitted to the University at the end of the training. Candidates will be examined orally by a Board of Examiners. The composition of which is as stipulated in the University regulations on such matters.
- ii. Candidates must offer all core/ compulsory courses and a minimum of 30 units of study are required for graduation.
- iii. Full-time candidates shall enrol for not more than 21 units in any one semester.

c) **Ph. D**

- i. A candidate who registers for the Ph.D. programme must in consultation with his supervisor present seminar and submit to the Department at the end of the first semester a comprehensive research proposal for assessment by a committee set up by the Department.
- ii. The candidate must in consultation with his supervisor present three seminars for assessment and contributions by the Department.
- iii. On completion of the research project, the candidate will be required to present a seminar on the findings of the work done.
- iv. A thesis describing and explaining the original work carried out and written in the format specified by the Postgraduate School must be submitted at the end of the programme.
- v. On submission of the thesis, the candidate will be examined orally by a Board of Examiners according to University regulation.

Course Code	Course Title	L	T	P	U
MCB711C	Biostatistics	2	1	0	3
MCB 713C	Microbial Physiology & Metabolism	2	0	3	3
MCB 715(c)	Microbial Ecology	2	1	0	3
MCB 727(c)	Microbiological Techniques	2	0	3	3
MCB 733(c)	Quality Control in Microbiology	2	1	0	3
MCB 739(c)	Research Method and Instrumentation	2	1	0	3
MCB 743(c)	General Microbiology 1	2	0	3	3
	Total	14	4	9	21

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
MCB 718C	Bacteriology	2	0	3	3
MCB 720C	General Virology	2	1	0	3
MCB 724C	Microbial Genetics	2	1	0	3
MCB 738C	General Parasitology	2	0	3	3
MCB 740C	Mycology	2	0	3	3
MCB 742C	Seminar	2	0	0	2
MCB 744 C	General Microbiology II	2	0	3	3
	TOTAL	14	2	12	20

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
MCB723C	Immunology and Immunochemistry	3	0	3	4
MCB 725C	Pharmaceutical Microbiology	2	0	3	3
MCB 747C	Plant pathology	2	0	3	3
MCB 749C	Pathogenic Microbiology	2	0	3	3
MCB 751C	Principle of Epidemiology and Public Health	2	0	0	2
MCB 753C	Molecular Biology	2	0	0	2
MCB 755C	Applied Parasitology	2	0	0	2
	Total	15	0	12	19

FOURTH SEMESTER

Course Code	Course Title	L	T	P	U
MCB 799C	Research Project	0	0	18	6
	Total	0	0	18	6

ENVIRONMENTAL MICROBIOLOGY :
COURSE OUTLINE/ FIRST SEMESTER

Course Code	Course Title	L	T	P	U
MCB711C	Biostatistics	2	1	0	3
MCB713C	Microbial Physiology & Metabolism	2	0	3	3
MCB715(C)	Microbial Ecology	2	1	0	3
MCB727(C)	Microbiological Techniques	2	0	3	3
MCB733(C)	Quality Control in Microbiology	2	1	0	3
MCB739(C)	Research Method and Instrumentation	2	1	0	3
MCB743(C)	General Microbiology 1	2	0	3	3
	Total	14	4	9	21

COURSE OUTLINE SECOND SEMESTER

Course Code	Course Title	L	T	P	U
MCB 718(c)	Bacteriology	2	0	3	3
MCB 720(c)	General Virology	2	1	0	3
MCB 724(c)	Microbial Genetics	2	1	0	3
MCB 738(c)	General Parasitology	2	0	3	3
MCB 740(c)	Mycology	2	0	3	3
MCB 742(c)	Seminar	2	0	0	2
MCB 744(c)	General Microbiology II	2	0	3	3
	TOTAL	14	0	12	20

COURSE OUTLINE THIRD SEMESTER

Course Code	Course Title	L	T	P	U
MCB719(c)	Aquatic Microbiology	2	0	3	3
MCB735(c)	Industrial Microbiology	2	0	0	2
MCB745(c)	Petroleum Microbiology	2	1	0	3
MCB747(c)	Plant pathology	2	0	3	3
MCB749(c)	Pathogenic Microbiology	2	0	3	3
MCB753(c)	Molecular Biology	2	1	0	2
MCB759(c)	Soil microbiology	2	1	0	2
	Total	15	0	12	19

FORTH SEMESTER

Course Code	Course Title	L	T	P	U
MCB 799(c)	Research Project	0	0	18	6
	Total	0	0	18	6

MEDICAL MICROBIOLOGY
FIRST SEMESTER

Course Code	Course Title	L	T	P	U
MCB 711(c)	Biostatistics	2	1	0	3
MCB 713(c)	Microbial Physiology & Metabolism	2	0	3	3
MCB 715(c)	Microbial Ecology	2	1	0	3
MCB 727(c)	Microbiological Techniques	2	0	3	3
MCB 733	Quality Control in Microbiology	2	1	0	3
MCB 739(c)	Research Method and Instrumentation	2	1	0	3
MCB 743(c)	General Microbiology 1	2	0	3	3
	Total	14	4	9	21

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
MCB 718(c)	Bacteriology	2	0	3	3
MCB 720(c)	General Virology	2	1	0	3
MCB 724(c)	Microbial Genetics	2	1	0	3
MCB 738	General Parasitology	2	0	3	3
MCB 740(c)	Mycology	2	0	3	3
MCB 742(c)	Seminar	2	0	0	2
MCB 744(c)	General Microbiology II	2	0	3	3
	TOTAL	14	4	12	20

THIRD SEMESTER

Course Code	Course Title	L	T	P	U
MCB 723(c)	Immunology and Immunochemistry	3	0	3	4
MCB 725(c)	Pharmaceutical Microbiology	2	0	3	3
MCB 747(c)	Plant pathology	2	0	3	3
MCB 749(c)	Pathogenic Microbiology	2	0	3	3
MCB 751 ©	Principle of Epidemiology and Public Health	2	0	0	2
MCB 753(c)	Molecular Biology	2	0	0	2
MCB 755(c)	Applied Parasitology	2	0	0	2
	Total	15	0	12	19

PROGRAME STRUCTURE

PGD FOOD MICROBIOLOGY

COURSE OUTLINE / FIRST SEMESTER

FOURTH SEMESTER

Key: C= Core or Compulsory Course

COURSE SYNOPSIS

MCB 711: BIOSTATISTICS (3 units)

Objectives and scope of research. Research procedures and materials selection. Preparation of report. Definition of statistical terms. Representation of numerical data. Data summarization, frequency, relative frequency, etc. Measures of central tendency, measure of dispersion.

MCB 713: MICROBIAL PHYSIOLOGY AND METABOLISM (3 units)

Aspects of microbial physiology; a revision of cell structure and function; growth and death of microorganism, nutrition; types of in relation to their energy metabolism and biosynthetic activity.

MCB 715: MICROBIAL ECOLOGY (3 units)

Microbes and ecology theory. Physiological, morphological, and genetic adaptation of microorganism to their environment. Microbial interactions. Microorganisms in ecosystems microbial bioconversions.

MCB 718: BACTERIOLOGY (3 units)

This course explains the history of bacteria, structure and functions of parts of the structure. It lets students know more about the bacterium as a living organism that has size, shape, metabolizes, feeds and grows although they are miniature in nature and cannot be seen with the naked eye. The student is exposed to the knowledge of the mode of nutrition in bacteria, the growth curve including the lag, log, stationary and decline phases. The students will be able to calculate the generation time for a bacterium and know that it differs from one bacterium to the other. This course further introduces and exposes the students to the knowledge of pathogenicity in bacteria. They will know what pathogens are, some common bacterial diseases and their causative organisms, the sources, symptoms, treatment and control of the infection. They will be able to know the different sources for the isolation of different bacteria. The Koch's postulate is presented to the students as an experimental procedure for isolating and identifying organisms responsible for particular diseases. Students will know theoretically and practically, how to isolate, identify and characterize bacteria

719 AQUATIC MICROBIOLOGY (3 units)

Nature of aquatic environment; microbiology of water supply; microbial flora of surface and ground waters; water treatments; water supply and public health. Conventional and advanced water treatment in hot climate and the use of water in agricultural irrigation, fish culture, industrial and for municipal purposes; sewage and sewage disposal in hot

climate, microbial aspect of water management; eutrophication and bioremediation, evolution, ecology and diversity of the marine environment, origin of life in the sea and the evolutionary patterns suggested by the marine fossil bed; major marine environment such as coral reefs, the deep sea floor, hydrothermal vent, the open ocean and the rotated zone diversity of plants and animals in each environment and the adaptation they have to vastly different conditions

MCB 720: GENERAL VIROLOGY (3 units)

Historical background and development of virology. Structure and composition of viruses. Mechanisms of viral replication/infections; lytic, latent/persistent viral infections. Bacteriophages. Plants and animal viruses. Viruses and diseases. Oncogenic viruses. Antiviral drugs and agents such as interferons. Techniques in virology; electron microscopy, serology, electrophoresis, collection, processing and analysis of samples for virological assays.

MCB 721: FOOD MICROBIOLOGY (3 units)

The occurrence and interactions of microorganisms with food. Intrinsic and extrinsic parameter of foods that affects microbial growth. Methods of detecting the presence of microbes in foods. Milk, meats and water microbiology. Effects of microbial growth on food fermentation, spoilage and food borne diseases. Food sanitation and microbiological food quality control. Microbial indicators of food sanitary quality (coliform bacteria, enterococci etc.)

MCB 723: IMMUNOLOGY AND IMMUNOCHEMISTRY (3 units)

Basic concept of immunology, antigen and antibody interaction. Modern techniques in immunochemistry. Diagnostic application of antigen antibody reactions e.g. Wasserman's test, blood grouping, pregnancy test, etc. Immune responses. Transplantation immunology, histocompatibility, antigens, graft versus host reactions. Tumour immunology and hypersensitivity reactions, tolerance, immunoprophylaxis and serotherapy

MCB 724: MICROBIAL GENETICS (3 units)

Current status of microbial genetics (bacteria, fungi, viruses and protozoa). Methods and findings in the area of mutagenesis, inductions, isolation and biochemical characterization of mutants. Adaptation, transformation, transduction, conversion and conjugation. Techniques in microbial genetics; experiments with virulent phages, template phages and lysogenic bacteria, fungi and other lower eukaryotic genetics.

MCB 725 – PHARMACEUTICAL MICROBIOLOGY (3 units)

Different types of their chemotherapeutic agents and antibiotics, chemistry and synthesis. Mode of action and assay of anti-microbial agents; concept of antibiotic sensitivity and resistance. Quality control of pharmaceutical products.

**MCB 727: MICROBIOLOGICAL TECHNIQUES
(3 units)**

Sterilization and disinfection. Culturing and sub culturing, preservation and storage of culture, inoculation techniques, formulation and preparation of media. Isolation of microorganisms (Microscopy and Spectrophotometry). Identification of microorganisms.

MCB731: FERMENTATION TECHNOLOGY (2 units)

Basic concepts of fermentation; alcoholic fermentation; resulting in production of bread, beer, wine and vinegar acid, fermentation leading to the production of cheese, butter, yoghurt, etc; malolactic fermentation

**MCB 733: QUALITY CONTROL IN MICROBIOLOGY
(3 units)**

This course will x-ray the use of microorganisms as reagents in qualitative and quantitative analysis. The measurement of microbial responses in assays and interpretation of results will be highlighted in this course. The issue of plant sanitation, quality control and microbiological standards and specifications will also be discussed

MCB 735:INDUSTRIAL MICROBIOLOGY (3 units)

Nature of industrial microbiology, microorganisms of industrial importance; Aspects of the Biology of moulds, yeast, bacteria, actinomycetes and viruses of importance in various fermentation. Culture techniques and maintenance of selected cultures. Mutation, strain selection and development, hybridization. Media formulation and economic optimization of fermentation media on laboratory scale. Perimeter design operation. Antifoams. Aspects of biochemical engineering; patent and patent laws. Production of mammalian provided substances by engineered microorganism (interferon, insulin, serum and albumin etc.).

MCB 738: GENERAL PARASITOLOGY (3 units)

This course is designed to give a broad overview of general parasitology, with respect to types of parasites, nature of parasitism, advantages and disadvantages of parasitism.

The course encompasses: Life cycle of some common parasites of man and animals, epidemiology and molecular biology of some tropical parasites; Field survey and laboratory methods in Parasitology; Concepts of hyperparasitism; Parasitology and the millennium development goal; Molecular basis of malarialpathology; Antimalaria drug resistance; Function and metabolism of trehalose in nematode worms; Reserve genetics of the model nematodes; Identification of novel antiparasitic reagents.

**MCB 739: RESEARCH AND METHODS
INSTRUMENTATION (3 units)**

Sterilization techniques; chemical separation techniques including chromatography, molecular sieves, ion-exchange, fraction collector, electrophoresis, density gradient and

fractional distillation, configuration and electron microscopy, photography; scientific writing- literature sources and retrieval; scientific illustrations and visual aids.

MCB 740: MYCOLOGY (3 units)

Mycology is a branch of Microbiology which involves the study of fungi. The course focuses on history, classification, identification and relevance of fungi to microbiology. Topics to Fungi, Fungi and the Challenges of the Millennium Development goals, classification, Laboratory Methods in Mycology, Collection and transportation of Fungal samples, Storage and processing of samples for mycological studies, be covered include Introduction and Course Overview, History of Mycology, Why study Fungi, Economic Importance of Demonstration of Koch's postulate, Structure, life cycle growth and development of fungi, Pathology and immunology of superficial systemic mycoses and actinomycoses, Fungigenetics and growth, Nutrition in Fungi, Fungi as heterotrophs Fungi physiology and metabolism, Fungi and Human affairs.

MCB 741 NUTRACEUTICAL (2 UNITS)

What are nutraceuticals? Economic importance of nutraceuticals. Some selected African foods with nutraceutical properties, edible macrofungi as sources of nutraceuticals. Development of nutraceuticals food using biotechnology. Differences between nutraceuticals and pharmaceuticals.

MCB 742: SEMINAR (2 units)

Oral and written presentation of an approved topic in Microbiology

MCB 743: GENERAL MICROBIOLOGY 1 (3 units)

Historical aspects of Microbiology with emphasis on the place of microorganisms in the world. Types of microorganisms – Bacteria, Viruses, Fungi, Rickettsiae, Chlamydia, protozoa, Algae, etc., growth and reproduction of microorganisms. Sterilization and disinfection; Control of Microorganisms by physical and chemical methods.

MCB 744: GENERAL MICROBIOLOGY 11 (3 units)

Microbial taxonomy with emphasis on systematic classification of bacteria, fungi, viruses, algae, protozoa etc. Isolation, characterization and identification of microbes. Biological and Biochemical reactions of microorganisms. Applied areas of microbiology; Bacterial cell structure and function, genetic system of bacteria; Bacteriophages of plasmids; Microbial growth and metabolism; Energy and nutrient harvesting microorganisms and the environment; Control of microorganism; Introduction to viruses and immunology;

Metabolic diversity among microorganism (photoautotrophs, photoheterotrophs, chemotrophs; The growth of bacterial cultures (bacterial division, generation time, logarithmic representation of bacterial populations, phases of growth, direct measurements of microbial growth, estimating numbers by indirect methods).

MCB 745 PETROLEUM MICROBIOLOGY (3 units)

Morphology and biostratigraphy of major groups of microfossils. Biological origin and accumulation of petroleum and sedimentary basis. Microbial aspect of genesis of petroleum. Microbial indicators in oil prospecting. Tertiary recovery of oil by means of microorganism. Microbial degradation of petroleum products and use of microorganisms in oil clean-up operations. Oil spillage, hydrocarbonoblastic bacteria; metallomonass bacteria that cause rusting of oil pipes; role of microorganisms in corrosion of oil fields equipment.

MCB 747: PLANT PATHOLOGY (2 units)

Principles and concepts in plants pathology; some disease of plants, animal and especially those prevalent in Nigeria. The geographical distribution of the pathogens; their isolation, identification, morphology, life cycles, source of inoculums, transmission and the effects on the host, etiology, cultural characteristics, and clinical manifestations of specific bacteria; viral and fungal pathogens of animals and plants; control of plant disease.

MCB 749: PATHOGENIC MICROBIOLOGY (3 units)

Principle of infection, etiology, epidemiology, pathogenic mechanisms, clinical symptoms. Laboratory diagnosis, prophylactic and therapeutic procedures. Control and prevention of selected infections: viral, bacterial, protozoan and fungal diseases of man, especially those prevalent in Africa.

MCB 751: PRINCIPLE OF EPIDEMIOLOGY AND PUBLIC HEALTH (3 units)

Nature of epidemiological investigations. Spectrum of infections; herds immunity and latency of infections; multifactorial systems in epidemics; zoonoses, Antigenic drifts, Biological products for recommended immunization schedules, international control of infectious diseases; statistical application to epidemiology.

MCB 753: MOLECULAR BIOLOGY (3 units)

Biogenesis, molecular structures and properties of molecular microtubules; mitochondria, chloroplast, membranes (nuclear and cytoplasmic), cell walls and other cellular structures. Membrane- membrane interactions. Biogenetics: different forms of energy existing in microorganisms; activation energy, catalysis and microbial enzymes as biocatalysts. Oxidation – reduction reactions; catalysis carriers. Energy release in microorganisms; substrate – level phosphorylation and electron – transport phosphorylation. Introduction and application of thermodynamics to chemical reactions in microbial systems.

MCB 755: APPLIED PARASITOLOGY (3 units)

Biology of some parasites of man and domestic animals in the tropics. These include classification, distribution, incidence, morphology, natural history, pathogenicity, laboratory diagnosis, therapeutic and prophylactic measures. Immunology of parasitic infection and the role of vectors in the transmission of parasitic diseases will also be taught. A

broad and multi disciplinary approach to the complex and dynamic relationship between parasites and their hosts. Covering life-cycles, ecology, physiology; Both prototons and helminthes will be considered with emphasis on the most important parasites of human studies including; immune response to parasites; chronicity of infection and its significance; host pathology; evasion of host responses by parasites, serodiagnosis, vaccination, chemotherapy and drug resistance; genetic resistance to parasitic infection; relevance of parasitic infections to society; indepth study of malaria with focus on the pathology; immunology and chemotherapy of this most important human pathistic

MCB 759 SOIL MICROBIOLOGY (3units)

Characteristics of soil environment; microbial and fauna of soil; microbial activities in soil,nitrogen cycle, carbon cycle; mineral transformation by microorganisms; ecological relationship among the soil pathogen; effects of peptides on soil microorganisms; biodegradation and biofuel generation.

MCB 763: FOOD PROCESSING (3 Units)

Principles and practice of food processing; techniques of processing and preservation of Nigerian foods with regard to their physio-chemical properties; canning containers; outline of cannig operartions; principal spoilage organisms in canned foods; use of radiation in food preservation; insect contamination as spoilage organisms; laboratory examination of canned foods; methods of detecting contaminants in food

MCB 799: RESEARCH PROJECT(6 units)

An original research project involving an investigation into a specific problem in Microbiology. The project will require both oral and written presentation to be examined and tested by external examiners, approved by Senate.

M. TECH. MICROBIOLOGY

ENVIRONMENT & MICROBIOLOGY OPTION)

FIRST SEMESTER

Course Code	Course Title	L	T	P	U
MCB 801 (C)	Methodology and Instrumentation				2
MCB 803 (C)	Biostatistics				3
MCB 815 (C)	Advanced Microbial Ecology				2
MCB 817 (C)	Advanced Aquatic Microbiology				2
MCB 819 (C)	Advanced Soil microbiology				2
MCB 821 (C)	Advanced Microbiology of Air				2
MCB 827 (C)	Advanced Microbial Genetics I	2	1		3
TOTAL					16

**M. TECH. MICROBIOLOGY
(ENVIRONMENTAL MICROBIOLOGY OPTION)
SECOND SEMESTER**

Course Code	Course Title	L	T	P	U
MCB 808 (C)	Biodegradation and Biodeterioration				2
MCB 812 (C)	Quality Control and Industrial Practices	1		3	2
MCB 814 (C)	Seminar				2
MCB 816 (C)	Management of Land and Air Pollution				2
MCB 818 (C)	Sewage and Water Treatment Technology				2
MCB 820 (C)	Epidemiology and Public Health				2
MCB 826 (C)	Advanced Microbial Genetics II	2		1	3
TOTAL					15

**M. TECH. MICROBIOLOGY
(MEDICAL MICROBIOLOGY OPTION)
FIRST SEMESTER**

Course Code	Course Title	L	T	P	U
MCB 801 (C)	Methodology and Instrumentation	1		3	2
MCB 803 (C)	Biostatistics				3
MCB 825 (C)	Advanced Pharmaceutical Microbiology				2
MCB 813 (C)	Special Topics in Immunology				3
MCB 823 (C)	Medical Bacteriology				3
MCB 827 (C)	Advanced Microbial Genetics I	2		1	3
TOTAL					16

**M. TECH. MICROBIOLOGY (FOOD MICROBIOLOGY OPTION)
SECOND SEMESTER**

Course Code	Course Title	L	T	P	U
MCB 802 (C)	Microbial spoilage of foods	1		3	2
MCB 804 (C)	Food preservation & Control of Spoilage				2
MCB 806 (C)	Applied Enzymology	2		3	3
MCB 808 (C)	Biodegradation & Biodeterioration				2
MCB 812 (C)	Quality Control and Industrial Practice	1		3	2
MCB 814 (C)	Seminar				2
MCB 826 (C)	Advanced Microbial Genetics II	2		1	3
MCB 828 (C)	Biotic Foods				2
TOTAL					18

**M. TECH. MICROBIOLOGY
(MEDICAL MICROBIOLOGY OPTION)**

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
MCB 812 (C)	Quality Control and Industrial Practices	1		3	2
MCB 814 (C)	Seminar				2
MCB 820 (C)	Epidemiology and Public Health				2
MCB 822 (C)	Medical Virology				3
MCB 824 (C)	Medical Mycology				3
MCB 826 (C)	Advanced Microbial Genetics II	2		1	3
TOTAL					15

**M. TECH. MICROBIOLOGY
(MEDICAL MICROBIOLOGY OPTION)
THIRD SEMESTER**

Course Code	Course Title	L	T	P	U
MCB 899 (C)	Research Project				12
TOTAL					12

**M. TECH. MICROBIOLOGY (FOOD MICROBIOLOGY OPTION)
THIRD SEMESTER**

Course Code	Course Title	L	T	P	Units
MCB 899 (C)	Research Project				12
TOTAL					12

KEY: C= Core or Compulsory Courses

**M. TECH. MICROBIOLOGY
(ENVIRONMENTAL MICROBIOLOGY OPTION)
THIRD SEMESTER**

Course Code	Course Title	L	T	P	U
MCB 899 (C)	Research Project				12
TOTAL					12

M. TECH SYNOPSIS

MCB 801 – Methodology and Instrumentation (2 Units)

Sterilization techniques; chemical separation techniques including chromatography, molecular sieves, ion-exchange, fraction collector, electrophoresis, density gradient and fractional distillation; configuration and electron microscopy, photography; scientific writing – literature sources and retrieval; scientific illustrations and visual aids.

MCB 802: Microbial Spoilage of foods (2 Units)

Microorganisms and the type of spoilage they cause, consequences of food spoilage – food borne illness, food infections and food poisoning; Determinants of microbial spoilage of some selected foods; factors affecting spoilage of foods; control of food spoilage.

MCB 803 – Biostatistics (2 Units)

Statistical notation, averages and standard deviations, normal distribution, t-distribution and confidence limits; statistical hypothesis and test of significance; Linear correlation and regression; principles of experimental design and analysis of variance involving completely randomized design, randomized complete block design, Latin square design, split-plot-design, factorial experiment and their applications in biological experimentation.

MCB 804: Food Preservation and Control of Spoilage (2 Units)

Prevention or delay of microbial decomposition of foods, prevention of self-decomposition of foods, prevention of microbial damage during handling, by animals, by insects etc. Use of chemical preservatives both organic and inorganic rules governing use of preservatives; Application of low temperature, drying etc.

MCB 805: Microbial Flora of Foods (2 units)

Sources of Microorganisms in foods, contaminants from the natural environment, contaminants during processing and handling. Contamination of fruits and vegetables and their products, contamination of meat and meat products, eggs and poultry, fish and sea foods, milk and milk products, sugar and sugar products, cereals and products, factors influencing types of microorganisms in foods, factors affecting growth of microorganisms in foods.

MCB 806 – Applied Enzymology (2 units)

Classification and nomenclature of enzymes; characterization of the main enzyme groups; survey of chemical kinetics, catalysis, order of reactions; Michealis – Menten kinetics; Thermodynamics of enzymic reactions; effect of pH on enzyme specificity; inhibition of enzymes, types of inhibition; investigation of the active centre; enzymes with more than one active centre; co-operatively between active centres; mechanism of enzyme action; role of enzymes in microbial and plant metabolism; Laboratory work involving isolation and purification of microbial and plant enzymes, and quantitative determination of the intermediate and end products.

MCB 807: Advanced Food Processing (2 units)

Techniques of processing preservation of Nigerian foods with regard to their physiochemical properties. Principles and practices of food processing. Canning, containers, outline of canning operation, principal spoilage microorganisms to canned foods. Use of Irradiations in food preservation; Laboratory examination of canned foods.

MCB 808: Biodeterioration and Biodegradation (2 units)

Types of deterioration and spoilage materials. Physical and chemical properties of such materials and how they are affected by activities of biodeteriogenic organisms. Measures of counter biodeteriogenic processes and their economic consequences.

MCB 809: Microbiological Examination of foods (2 units)

Microbiology of foods. Methods of enumerating, isolation and identifying microorganisms important in food processing, preservation and distribution of foods. Predictive Microbiology: Concept and Principles.

MCB 810 – Research Project (12 Units)

A research project involving investigation on a selected Microbiological problem. The project is to be written up as a dissertation.

MCB 811: Advanced Food Fermentation (2 Units)

Microbial fermentations, Microbial production of drinks such as beer, wine, liquors, distilled carbonated soft drinks, local traditional alcoholic beverages, bread, dairy products, Nigerian fermented foods such as Ogiri, soy-Iru, fufu, soy-Ogi, Lafun, Ukpaka, Cocoa Beans, Warankasi, Gaari.

MCB 812 : Quality Control and Industrial Practices (2 units)

Functions of Quality Control, its relationship with other departments in the industry sampling inspection and assay, continuous sampling. Measurements and control Industrial Hygiene. Work Practices spoilage response of chemicals. Safety information Toxicology information and laboratory hygiene, setting up a quality control unit.

MCB 813: Special Topics in Immunology (3 units)

The immune system; organs and cells of the immune system. Mechanisms of immunity. Cytokines. Cancers of the immune system. Immune response. Immune disorders. Immunohematology. Transplantation Immunology. Vaccinations/Immunizations. Clinical applications in diagnosis of infections. Autoimmune Diseases, Allergic Diseases, Immunologic Deficiency Diseases, HLA and Diseases, Nutrition and Immunity.

MCB 814: Seminar (2 Units)

This is also known as independent study or research. Each student will deliver a Seminar on selected topics and submit a write up on the topic selected.

MCB 815 – Advanced Microbial Ecology (2 Units)

Microbial Ecology and the Ecosystem; the Genome as a component of the Ecosystem; characteristics of Microbial Ecosystems; Microbial Associations; Techniques for the study of Microbial Ecosystems.

MCB 816 – Management of Land and Air Pollution (2 Units)

Types of land pollution; methods of solid waste disposal in Nigeria; techniques of better waste management; Biogas technology; Possible sources of air pollution; Effects of Air pollutants on man & plants. Microbial indicators of air pollution. Various methods of air sampling; control methods of air pollution.

MCB 817 – Advanced Aquatic Microbiology (2 Units)

Microorganisms associated with the aquatic environment. Distribution of microorganisms in the aquatic environments, Role and Importance of aquatic microbial ecosystem. Factor affecting the distribution of microorganisms in such environment; Eutrophication and the various algae involved. Sources of nutrients and factors responsible for eutrophication; Consequences of eutrophication on the Nation's economy; various methods of control of eutrophication.

MCB 818 – Sewage and Water Treatment Technology (2 Units)

Sewage and other oxygen demanding wastes; types of microorganisms that could be found in water as a result of sewage pollution; Detection of faecal contamination; Sewage treatment process; sewage lagoons, Trickling filter method; Anaerobic digestion; Removal of refractory compounds; Water treatment technology; Water borne diseases.

MCB 819 – Advanced Soil Microbiology (2 Units)

The soil environment; The microbiota of the soil; microorganisms as agents of geochemical change. The cycles of matter; The phosphorus cycle; the cycles of carbon & Oxygen; Nitrogen cycle; Sulfur cycle. The cycle of matter in anaerobic environments. The cycle of matter through geological time. The influence of man on the cycle of matter. Degradation of pesticides. Factors affecting microbial population in the soil. Relationship between higher plants and soil microorganisms. Ecological consequences of oil spill.

MCB 820 – Epidemiology and Public Health (2 Units)

Principles of Epidemiology and Public Health; Nature of epidemiological investigations; The role of Laboratory in epidemiological studies; Sources and mode of spread of infections; Communicable diseases in Nigeria; and preventive measures.

MCB 821 – Advanced Microbiology of Air (2 units)

The microbial content of air; Techniques for Microbial Analysis of Air; Implication on the health of man. Human airborne infections; Factors affecting the presence of microorganisms in the atmosphere composition if unpolluted dry air of the atmosphere.

MCB 822- Medical Virology (3 Units)

Viruses of Medical importance; pathogenesis and clinical features, Laboratory diagnosis, therapeutic and prophylactic measures & epidemiology. Antiviral agents, Applied serology, Immunity.

MCB 823 – Medical Bacteriology (3 Units)

Bacterial pathogens of man and associated diseases. Pathogenesis, Laboratory diagnosis; biochemical testing of bacteria, serologic diagnosis, therapeutic and prophylactic measures and epidemiology. Safety in Microbiology, Chlamydiae and associated diseases, Rickettsiae and associated diseases, Mycoplasmas and associated diseases.

MCB 824 – Medical Mycology (3 Units)

Fungi of medical importance especially in the tropics; pathogenesis, laboratory diagnosis, treatment, epidemiology and control.

MCB 825 – Advanced Pharmaceutical Microbiology (2 units)

Antibiotics and other antimicrobial agents of microbial origin. Vitamins, enzymes and amino acids obtained from microbes and their pharmaceutical importance.

MCB 826- Advanced Microbial Genetics I (3 Units)

Structural and functional genomics: definition, historical prospective and strategies. Genome Structure: genome sizes, microbial and organelle genome, genome physical mapping and sequencing, tools in genome analysis. Structural and functional annotations of genes and genomes. An overview of microbial genome projects. Regulation of gene expression in microorganisms: operon concept, repression of the *lac* operon, regulation of tryptophan biosynthesis operon by attenuation, catabolite repression instability of bacterial RNA, positive and negative regulation, inducers and co-repressors. Negative regulations - *Escherichia coli lac* operon, regulation of the heat-shock regulon by an alternate sigma factor, two component regulatory systems. Genetics of bacteria, viruses, algae fungi, etc.

MCB 827- Advanced Microbial Genetics II (3 Units)

Development of microbial strains. Recombinant DNA Technology. Genetic Engineering: description, methods and applications with emphasis on microorganisms. Genetic Library: description and need for genetic library, composition and methodology of library construction. Metagenomics: definition, principles and techniques used in metagenomic, high throughput screening, metagenomics of archeal samples. Taxonomy and phylogeny: concepts in systematics, taxonomy and phylogeny. Description and various types of phylogenetic trees. Microbial phylogeography, phylogenetic analysis algorithms. Sequencing: different types, techniques and applications of sequencing.

MCB 828- Biotic Foods (2 Units)

Definition of Biotic Foods. Probiotics, Prebiotics, Synbiotics and Pharmabiotics. Characteristics of Probiotics, Prebiotics, Synbiotics and Pharmabiotics. Mechanism of action. Health Benefits. Economic importance.

MCB 829- Food Safety and Food Security (2 Units)

Definition of food safety and food security. Safe food handling practices, food hygiene. Food-borne diseases, food-borne illness. Food infection and food intoxication. Food pathogen, Food spoilers. HACCP. Regulatory Agencies in food-NAFDAC, SON, WHO, FAO, ISO, CODEX Alimentarius. Factors affecting food security e. g. Effect of climate change on food availability. Consequences of food insecurity. Challenges to achieving food security

POSTGRADUATE LECTURERS

NAME	QUALIFICATION (S)	STATUS	AREA OF SPECIALIZATION
Prof. B. E. Boboye	B.Tech. (Akure), M.Sc. (Ife), Ph.D. (Switzerland)	Professor	Genetics/Molecular Biology
Prof. F. C. Adetuyi	B.Sc.(Ibadan), M.Sc. (Jos), Ph.D. (London)	Professor	Environmental Microbiology/Phytobacteriology
Prof. F. A. Akinyosoye	B.Sc.(Arkansas), M.Sc. (Texas), Ph.D. (Ilorin)	Professor	Food Fermentation/Enzymology
Prof. A. K. Onifade	B.Sc.(Ado-Ekiti), M.Sc. (Ibadan), Ph.D. (Ilorin)	Professor	Phytopathology/Toxicology
Prof. (Mrs.) T. T. Adebola	B.Sc., M.Sc., Ph.D. (Ife)	Professor	Infections/Immunity
Prof. (Mrs.) B. J. Akinyele	B.Sc., M.Sc. (Ilorin), Ph.D. (Akure)	Professor/HOD	Food Microbiology/Mycology
Prof. V. O. Oyetayo	B.Tech.(Akure), M. Sc. (Port-Harcourt), Ph.D. (Akure)	Professor	Development of Biotic Foods
Prof. M. K. Oladunmoye	B.Sc. (Ife), M.Sc. (Zaria), Ph.D. (Akure)	Professor	Pharmaceutical Microbiology
Prof. (Mrs.) O. A. Ogundare	B.Sc., M.Sc. (Ife), Ph.D. (Akure)	Professor	Pharmaceutical Microbiology
Dr. D. J. Arotupin	B.Sc., M.Sc. (Ilorin), Ph.D. (Akure)	Reader	Microbial Enzymes
Dr. A.O. Ojokoh	B.Sc. (Ekpmoma), M.Sc. (Benin), Ph.D. (Akure)	Reader	Food and Industrial Microbiology
Dr. E.O. Dada	B.Sc., M. Sc. (Jos), Ph.D. (Akure)	Reader	Medical Parasitology
Dr. F.O. Ekundayo	B.Sc., M.Sc., Ph.D. (Ibadan)	S. Lecturer	Environmental Microbiology
Dr.(Mrs.) D.V. Adegunloye	B.Sc. (Abeokuta), M.Tech., Ph.D. (Akure)	S. Lecturer	Environmental Microbiology
Dr. (Mrs.) F. O. Omoya	B.Tech., M.Tech, Ph.D. (Akure)	S. Lecturer	Environmental Health Microbiology
Dr. (Mrs.) O. F. Olukunle	B.Tech., M.Tech., Ph.D. (Akure)	Lecturer I	Molecular Environmental Microbiology
Dr. O.O. Olaniyi	B.Sc. (Ilorin), M.Tech., Ph. D. (Akure)	Lecturer II	Food Microbiology
Dr. A. O. Olalemi	B.Tech., M.Tech. (Akure), Ph. D. (UK)	Lecturer II	Environmental Microbiology

DEPARTMENT OF MATHEMATICAL SCIENCES (MTS)

POSTGRADUATE PROGRAMMES

1. PROGRAMMES OFFERED

- a. Master of Technology (M. Tech) in Industrial Mathematics
- b. Doctor of Philosophy (Ph. D) in Mathematics

2. AVAILABLE OPTIONS/SPECIALIZATION (DEGREE OPTION)

- (i) Numerical Analysis
- (ii) Fluid Dynamics
- (iii) Analytical Dynamics
- (iv) Optimization

3. THE PHILOSOPHY/OBJECTIVES OF THE PROGRAMME FOR

- i) Master of Technology (M.Tech) Industrial Mathematics
- ii) Doctor of Philosophy (Ph.D) Mathematics

The Philosophy of the Programme

The programme is designed to equip students with adequate knowledge and skills in Mathematics with focus on application to solving real life and industrial problems. Emphasis is placed on the following five areas around which the student would be expected to specialize. The areas are as listed in 2 above.

The objectives of the programme are to:

- i. give academic and professional training in all areas of Mathematics for the development of latent power of thinking of individuals.
- ii. provide and promote sound practical and theoretical training in Mathematics as foundation for technological development in Nigeria.
- iii. identify the basic scientific and technological problems in area of Mathematics and find appropriate solutions to them.
- iv. equip students with critical thinking skills that will enable them to solve real-life problems in areas of agriculture, commerce, industry, medicine and other disciplines that requires the knowledge of Mathematics.
- v. give training for the purpose of job placement in the industries for self-actualization.

4. ADMISSION REQUIREMENTS

a. M.TECH. (INDUSTRIAL MATHEMATICS) PROGRAMME

A prospective candidate must hold a B.Tech, B.Sc or B.Sc. Ed. degree (not lower than Second Class Lower Division) in Mathematics of any recognized University/College of

Education as a requirement for admission into the School of Post-graduate Studies (SPGS) of the Federal University of Technology, Akure, for the M.Tech. Industrial Mathematics Programme in the department.

b. Ph.D (MATHEMATICS) PROGRAMME

The candidate must have a good Masters degree in Mathematics from any recognized University.

5. DURATION OF THE PROGRAMME

a. M.Tech. PROGRAMME

The Masters of Technology (M.Tech) Programme shall normally run for eighteen (18) calendar months for full-time. There is no part-time studentship for the programme. The first two academic semesters of the M.Tech programme will be devoted to course work. The third semester will be devoted mainly to supervised research work in a specialized area of real life problem. There shall be a proposal seminar and at least a progress seminar before the student is presented for the oral examination of his/her research work.

b. Ph.D. PROGRAMME

The Ph.D programme will normally run for at least thirty-six (36) calendar months of intensive research work for full-time and forty-eight (48) calendar months for part-time students. There shall be a proposal seminar and at least two progress seminars before the student is presented for an open oral examination of his/her research thesis.

6. DEGREE REQUIREMENTS

a. M.TECH DEGREE INDUSTRIAL MATHEMATICS

Each student must take at least 18 credit load units of course work spread over at least two of the research options 2(i) - (iv) above in the department, at least nine out of the 18 credits must be chosen from the major area of specialization and at least four from option (i). In addition, two units of seminar must be successfully offered as indicated. Furthermore, the student will complete satisfactorily a supervised project in any area of applied mathematics and present a written thesis and pass an oral examination on the dissertation. A minimum of 42 units of study are required for graduation including the research project.

b. Ph.D. DEGREE MATHEMATICS

Any student wishing to obtain a Ph.D. degree in mathematics must undertake a supervised programme of study in any of the options specified above. The student will be required to:

- i. Complete an approved Research program of at least six semesters.
- ii. Present at least two seminars on his research topic before an additional one on completion of the research work.
- iii. Complete a doctoral thesis and pass an oral examination.

- iv. Demonstrate adequate knowledge of the basic concepts and techniques of the option chosen.
- v. Show high intellectual achievement in the oral examination.

Alternative complementary principles, estimates for linear functional. Linear boundary value problems. Non-linear Applications.

MTS 803 Numerical Methods and Computing 4 Units C

Introduction to Programming Languages (e.g. Fortran, Matlab and Maple) and their applications in solving following numerical problems:

- A. Numerical solution of initial value problems (IVPs) for ordinary differential equations (ODEs)
 - (i) Single-step method – Euler's Method; Runge-Kutta (2nd and fourth order)
 - (ii) Multistep Methods – Adams-Moulton Method; Milne-Simpson Method; Evaluation of each of the methods in terms of consistency, convergence and stability.
- B. Numerical solution of BVP for ODE
 - (i) Shooting method
 - (ii) Finite difference method
 - (iii) Raleigh method.
- C. Solving each of classes of ODE's using the finite difference method appropriate system matrix representation (e.g. tridiagonal matrix) and relevant iterative linear systems method (e.g. Gauss-Siedel or Gaussian elimination methods).
- D. Graphical presentation of results output using Excel or any other appropriate graphical packages.

MTS 804 Modelling and Simulation 3 Units C

Definition and classification of models; principles of mathematical Modelling; Modelling Environment; Modelling Techniques - Dimensional Analysis, Finite difference, Calculus, Linear Programming methods, finite element method.

MTS 805 Numerical Analysis I 3 Units E

Solution of algebraic equations; direct methods for linear equation, orthogonal factorisation, spare-matrix techniques. Markowitz criterion, applications; Solution of non-linear equation; one point iterative methods, Newton's and Brain Methods, Regular Falsi method, Gram-Schmidt method, convergence and stability of these methods; applications of these methods. Computing in programming languages.

Note: Compulsory for Numerical option

MTS 806 Numerical Analysis II 4 Units E

Partial differential equations – classification into elliptic, parabolic and hyperbolic equations; Parabolic - solution techniques by explicit methods, Fourier stability methods, matrix methods, stability and convergence analysis of these methods; Elliptic equation solution techniques by finite difference methods, interactive methods ADI methods, Block iteration methods; SOR methods; convergence and stability of these methods. Hyperbolic equation - solution techniques by methods of characteristics, explicit methods, hybrid

MASTERS DEGREE PROGRAMME

COURSE CODES: FIRST SEMESTER

Course Code	Course Title	L	T	P	U
MTS 801	Mathematical Methods			4	
MTS 803	Numerical Methods and Computing			4	
MTS 805	Numerical Analysis I			3	
MTS 807	Numerical Techniques in ODE			3	
MTS 809	Viscous flow Theory			3	
MTS 811	Advanced Analytical Dynamics			4	
MTS 813	Dynamics of Distribution-Parameter System			3	
MTS 815	Computational Methods in Optimization I			3	
MTS 817	Graduate Seminar			2	
	Total			29	

SECOND SEMESTER

Course Code	Course Title	L	T	P	U
MTS 802	Complementary Variational Principles			4	
MTS 804	Modelling and Simulation			3	
MTS 806	Numerical Analysis II			4	
MTS 808	Incompressible Boundary Layer Theory			4	
MTS 810	Large-Scale Atmospheric Flow			3	
MTS 812	Methods of Applied Maths in Dynamics			3	
MTS 814	Computational Methods in Optimization II			3	
MTS 816	Computational Methods in Optimization III			3	
	Total			27	

THIRD SEMESTER

MTS 899	Master's Thesis Research Project			12	
	Total			12	

COURSE SYNOPSIS

M. TECH INDUSTRIAL MATHEMATICS

MTS 801 Mathematical Methods 4 Units C

Fourier integrals and relation to Fourier series; Properties of the transform; Hypergeometric equation; functions expressible by Hypergeometric series asymptotic series; Euler Transform; Legendre functions; eigenfunctions and their use; [perturbation methods, gamma function; Green's function Laplace transform].

MTS 802 Complementary Variational Principles 4 UnitsE

Euler-Lagrange Theory; Canonical Formalism; Convex functions. The inverse problem, A class of linear problems, Variational formulation, complementary principles, The hypercircle, Error estimates for approximate solutions,

methods, Hopscotch methods convergence; stability analysis of these methods

Note: Compulsory for Numerical option

MTS 807 Numerical Tech in ODE 3 Units E

Initial and Boundary value problem in ODEs; Numerical approximation of solution; higher order one-step methods - Taylor series, R-K methods; convergence and stability of these methods; Multistep methods- Adams-Moulton methods, predictor-corrector methods; consistency, order, convergence and stability of these methods; topics in approximation - Chebyshev polynomial approximation, least-square approximation, approximation by Series and Rational approximation.

Note: Compulsory for Numerical option

MTS 808 Incompressible Boundary Layer Theory 3 Units

Model problems; Derivation of unsteady boundary layer equations; similarity solutions; steady boundary layer equations; Exact solutions; Approximate solutions of boundary layer equations; occurrence of separation.

Note: Compulsory for Fluid Dynamics option

MTS 809 Viscous Flow Theory 4 Units E

Nature of Viscosity, Equation of motion, special viscous flow problems, methods of solution, outlines of solutions, flow through porous medium. Energy equation, physiological flow model of blood, flow in capillaries. Non-reacting flow near a stagnation-point, viscous heating in a circular tube. Boundary layer theory, triple deck theory, reacting viscous flow. Boundary layer of a stagnation-point reacting flow.

Note: Compulsory for Fluid Dynamics option

MTS 810 Large-Scale Atmospheric Flow 3 Units E

Governing Equations. Simple Types of wave motion in the Atmospheric. Scale Analysis Integral Relations Regarding Vorticity and Energy Numerical Methods. Barotropic Models. Baroclinic Models. Multi level models.

Note: Compulsory for Fluid Dynamics option

MTS 811 Advanced Analytical Dynamics 4 Units E

Principles of dynamics, strain energy, virtual work, variational principle. Lagrange's equation. Discrete systems, eigenvalue, natural mode of vibration. Approximate methods for finding natural modes and frequencies.

Note: Compulsory for Solid Mechanics option

MTS 812 Methods of Applied Mathematics in Dynamics 3 Units E

In context of application in dynamics, regular and singular perturbation theory, method of matched asymptotic expansions, two-timing (methods of multiple scales) WKB approximation. Averaging methods.

Note: Compulsory for Solid Mechanics option

MTS 813 Dynamics of Distribution-Parameter System 3 Units E

Dynamics of continuous elastic systems (strings, rods, beams membranes and plates); formulation and solution of the boundary value problems; Rayleigh's energy methods; Ralyeigh-Ritz methods; Galerkin's method.

Note: Compulsory for Solid Mechanics option

MTS 814 Computational Methods in Optimization II 3 Units E

Optimization problems; Examples of optimization problems; optimization problems in one dimension; Iterative methods of optimization; least squares methods for solving equation; contraction mapping theorem; Newton's methods; Steepest Descent Methods; Conjugate direction Methods in R; Conjugate Gradient Algorithm; Projection Methods.

MTS 815 Computation Methods in Optimization I 3 Units E

Equality and Inequality Constraints; Unconstrained Minimization; Pontryagin's principles; Hamiltonian Principles; Extremization of Integrals; Sensitivity analysis; Penalty methods; function space Algorithm; Projection Methods and Application to Optimal Problems.

MTS 816 Computation Methods in Optimization III 3 Units E

Rate of convergence, Conjugate Gradient Methods superlinear convergence: quasi-methods. Superconvergence: conjugate Gradient Methods superlinear convergence variable metric algorithm, Projection.

Note: Compulsory for Optimization option

MTS 817 Graduate Seminar 2 Units C

Presentation of at least one seminar before the end of the program

MTS 899 Master's Thesis Research Project 12 Units C

Remarks: C = Compulsory for all students; E = Elective

Ph.D DEGREE IN MATHEMATICS

MTS 999 Doctoral Research Project 12 Units

Original research project, which must involve independent investigations in any of the listed fields, should make new and significant contributions to the understanding and knowledge of Mathematics. The report should be presented in form of a thesis using approved format. Every candidate must present, at least, two successful seminars before submission of Ph. D thesis report for examination

1. ACADEMIC STAFF

S/N	NAME	QUALIFICATION	STATUS	AREA OF SPECIALIZATION
1	Prof. S.J. Kayode	B. Sc. (Ife), M.Sc.(Ibadan), Ph.D. (Akure)	Professor /H.O.D	Numerical Analysis
2	Prof. S.T. Oni	B. Sc., M. Sc., Ph.D. (Ilorin)	Professor	Solid Mechanics
3	Prof. O.K. Koriko	B. Sc. (Nsuka), M.Sc. (Ibadan) Ph.D. (Akure)	Professor	Fluid Mechanics
4	Prof. R.A. Ademiluyi	B. Sc. (Ibadan), M. Sc.(ABU), Ph.D. (Benin)	Professor	Numerical Analysis
5	Prof. O. Olotu	B. Sc. M. Sc. (Maryland), Ph.D. (Ado-Ekiti)	Professor	Optimization
6	Prof. F.I. Alao	B. Sc. (Benin), M.Tech., Ph.D (Akure)	Professor	Fluid Mechanics
7	Dr. K.S. Adegbie	B. Tech., M.Tech., Ph.D (Ogbomoso)	Reader	Fluid Mechanics
8	Dr. (Mrs.) B.T. Olabode	B.Sc., M.Sc. (Ilorin), Ph.D. (Akure)	Reader	Numerical Analysis
9	Dr. B. Omolofe	B.Tech., M.Tech., Ph.D (Akure)	Reader	Solid Mechanics
10	Dr. T.O. Awodola	B.Tech., M.Tech., Ph.D (Akure)	Reader	Solid Mechanics
11	Dr. E.A. Areo	B.Sc.(Ilorin), M.Sc.(Jos), Ph.D.(Ilorin)	Senior Lecturer	Numerical Analysis
12	Dr. A.J. Omowaye	B.Sc. (Ado-Ekiti), M.Tech (Akure), Ph.D (Ogbomoso)	Senior Lecturer	Fluid Mechanics
13	Dr. T.T. Yusuf	B.Sc. (Ado-Ekiti), M.Inf.Sc. (Ibadan), M.Sc. (England), Ph.D. (Cape Town)	Senior Lecturer	Mathematical Biology
14	Dr. K.M. Owolabi	B.Sc. (Ilorin), M.Tech. (Akure), Ph.D. (Cape Town)	Lecturer I	Numerical Analysis
15	Dr. M.K. Duromola	B.Sc. (Ibadan), M.Tech., Ph.D. (Akure)	Lecturer II	Numerical Analysis

9.6.7 DEPARTMENT OF PHYSICS

2. PROGRAMMES OFFERED

- (a) Postgraduate Diploma (PGD)
- (b) Master of Technology (M.Tech)
- (c) Master of Philosophy (M.Phil.)
- (d) M.Phil./Ph.D
- (e) Doctor of Philosophy (Ph.D)

3. AVAILABLE OPTIONS / SPECIALIZATION

The Department award

- (a) PGD in Physics with electronics
- (b) M.Tech
- (c) M.Phil. degrees with specialization in
 - (i) M.Phil. (Condensed Matter Physics)
 - (ii) M.Phil. (Electronics Measurements and Instrumentation)
 - (iii) M.Phil. (Communication Physics)
 - (iv) M.Phil. (Space Physics)
 - (i) M.Phil. (Atmospheric Physics)
 - (ii) M.Phil. (Radiation and Health/Medical Physics)
 - (iii) M.Phil. (Energy Physics)
- (d) M.Phil./Ph.D
- (e) Ph.D. degrees with specialization in
 - (i) Condensed Matter Physics
 - (ii) Electronic Measurements and Instrumentation
 - (iii) Communications Physics
 - (iv) Radiation and Health Physics
 - (v) Space Physics
 - (vi) Atmospheric Physics

4. PHILOSOPHY AND OBJECTIVES

The philosophy of the Federal University of Technology, Akure is to produce practical oriented graduates. In line with this philosophy, the Department offers postgraduate studies with a variety of experience in applied Physics, with particular emphasis on certain field which are relevant to the economic and technological development of the country. The programmes of the Department are therefore designed to give students the required academic and practical background in Condensed Matter Physics, Space Physics, Radiation and Health Physics, Communication Physics and Electronic Instrumentation Physics.

The objectives of the programme are to:

- (i) Impart in the students the fundamentals of the main branches of physics.
- (ii) Provide students with opportunity for integrating theoretical physics with practical in all branches of physics.
- (iii) Expose the students to all aspects of applied physics sine qua non to the development of Condensed Matter, Electronics and Energy.
- (iv) Equip the students with capability for research and development in all areas of theoretical and applied physics.

5. ADMISSION REQUIREMENTS:

Candidates must satisfy the general regulations governing postgraduate studies at the Federal University of Technology, Akure. In addition, the following departmental requirements should be met:-

(a) PGD Programme

Applicants shall possess HND or AIST in any area of physical sciences. Candidates with good honours first degree in any area of physics or third class with experience in industry or government establishment shall also be considered for admission.

(b) M.Tech Programme

- (i) Candidates with at least a Second Class (Lower Division) B.Tech. Degree in Physics recognized University is eligible for admission.
- (ii) Candidates with at least a Second Class (Lower Division) in Mathematics, Geography, Meteorology and Chemistry from the Federal University of Technology, Akure or any other recognized University may be considered for admission on their own merit. Students who have minor deficiencies in undergraduate preparation, particularly on the areas mentioned in (ii) will be given the opportunity, and may be required to make good these deficiencies before proceeding to postgraduate courses.

(c) M.Phil Programme

The requirements for admission into the M.Phil programme consist of:

- (i) M. Tech in any field of Physics from The Federal University of Technology, Akure, with a CGPA of not less than 2.5 on a 5-point credit scale or a minimum overall score of 50% in Master's thesis research project. M. Tech in any field of Physics from other recognized institutions with a CGPA of not less than 3.0 on a 5-point credit scale or a minimum overall score of 55% in Master's thesis research project.
- (ii) M. Tech in any field of Physics from other recognized institutions with a CGPA of not less than 3.0 on a 5-point credit scale or a minimum overall score of 55% in Master's thesis research project.

(d) M.Phil/Ph.D Programme

The requirements for admission into the M.Phil/Ph.D programme consist of

- i. M. Tech in any field of Physics from The Federal University of Technology, Akure, with a CGPA of not less than 3.0 on a 5-point credit scale or a minimum overall score of 55% in Master's thesis research project.

- a minimum overall score between 55 and 59% in Master's thesis research project.
- ii. M. Tech in any field of Physics from other recognized institutions with a CGPA of not less than 3.0 on a 5-point credit scale or a minimum overall score of 55% in Master's thesis research project or as interpreted according to the respective institution(s).

(d) Doctor of Philosophy (Ph.D) Programme

Candidates for the Ph.D. degree should have obtained the M.Tech degree in Physics from the Federal University of Technology, Akure or any other recognized University with any average grade of B. Where applicable the candidates may be required to score at least 60% in the Master's thesis examination.

6. DURATION OF PROGRAMME

(a) PGD Programme

The **PGD** shall be for a period of 12 months. The two semesters shall be by course work and examinations. The candidates shall present a research project submitted and approved at the end of second semester.

(b) M.Tech Programme

The **M.Tech.** programme shall be for a period of 18 months. The first two semesters shall be by course work and examinations. The third semester shall be by thesis based on a research proposal submitted and approved at the end of the second semester.

(e) M.Phil Programme

The duration of the M.Phil programme shall be as follows:

Full Time: a minimum of 12 months and maximum of 18 months

(e) Doctor of Philosophy (Ph.D) Programme

The Ph.D. shall normally be required to spend between 36 and 48 months for full-time candidates and between 48 and 72 months for part-time candidates.

7. REQUIREMENT FOR GRADUATION

(a) PGD

In addition to satisfying other University regulations, the student must have passed all the courses prescribed by the department and must have obtained a satisfactory grade in the PGD Project according to the regulation of School of Postgraduate Studies.

(a) M.Phil

To be eligible for the award of the Master of Philosophy degree in Physics (M.Phil.), candidate must have:

- (a) passed all courses recommended by the department and attain at least a pass mark of 50% in the required courses;

- (b) successfully present at least two research seminars (proposal and post research seminars);
- (c) fulfilled all other conditions as prescribed by the Board of SPGS of the University; and
- (d) successfully defended the research thesis which shall be assessed at an oral examination organized by the School of Postgraduate Studies.

Candidates who obtain less than 60% or CGPA of 3.5 on a 5-point credit scale shall not qualify for admission into the Ph.D programme and shall be awarded a terminal M.Phil degree.

Requirements for Conversion from M. Phil. to Ph.D. Programme

A candidate who enters the M.Phil. degree programme may be allowed to transfer to the Ph.D. programme if he/she makes a satisfactory progress in his/her study. Such candidate will be expected to fulfill the following requirements:

- (a) completes all course work with a CGPA of not less than 3.50 in the programme;
- (b) prepares and submit to the Postgraduate School through the Department, research plan considered suitable for pursuing a Ph.D. programme;
- (c) presents a detailed report of research work done up to the time and submits to the School of Postgraduate Studies any relevant published or unpublished materials (if any) that can be used to assess him by the Department;
- (d) passes an oral transfer examination to be conducted by SPGS with the panel of examiners drawn from his/her Department on the subject of the research and related topics to the field of study; and
- (e) fulfilled all other conditions as prescribed by the Board.

Requirements for Conversion from M.Phil./Ph.D to Ph.D. Programme

A candidate who enters the M.Phil. degree programme may be allowed to transfer to the Ph.D. programme if he/she makes a satisfactory progress in his/her study. Such candidate will be expected to fulfill the following requirements:

- (a) prepare and submit to the Postgraduate School through the Department, research plan considered suitable for pursuing a Ph.D. programme;
- (b) presents a detailed report of research work done up to the time and submits to the School of Postgraduate Studies any relevant published or unpublished materials (if any) that can be used to assess him by the Department;

- (c) passes an oral transfer examination to be conducted by SPGS with the panel of examiners drawn from his/her Department on the subject of the research and related topics to the field of study; and
- (d) fulfilled all other conditions as prescribed by the Board. Candidates who obtain less than 60% in thesis project shall not qualify for admission into the Ph.D programme and shall be awarded a terminal M.Phil degree.

8. COURSE OUTLINE

(a) POSTGRADUATE DIPLOMA (PGD)

FIRST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 701	Mathematical Methods	2	1	0	3
PHY 703	Analytical Mechanics	2	1	0	3
PHY 705	Introductory Solid State Electronics	2	1	0	3
PHY 707	Digital Electronics	2	1	0	3
PHY 709	Electronics Devices Design & Fabrication	2	0	3	3
	TOTAL				15

SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 702	Electromagnetism	2	1	0	3
PHY 704	Quantum Physics	2	1	0	3
PHY 706	Electrical Measurement & Instrumentation	2	0	3	3
PHY 708	Nuclear & Particle Physics	2	1	0	3
PHY 710	Vacuum Physics & Thin Film Technology	3	0	0	3
PHY 712	Energy Conversion And Storage	3	0	0	3
	TOTAL				18

THIRD SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 799	PGD Research Project	0	0	18	6
	Total				6

(b) MASTER OF TECHNOLOGY (M.Tech)

(b1) M.Tech in Condensed Matter Physics

FIRST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 801 C	Methods of Mathematical Physics	2	1	0	3
PHY 821C	Quantum Mechanics	2	1	0	3
PHY 803C	Electrodynamics	2	1	0	3
PHY 823C	Computational Physics	2	0	3	3
PHY 817C	Digital Electronics	2	0	3	3
	TOTAL				15

SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 804	Advanced Laboratory & Experimental Techniques	0	0	9	3
PHY 808	Solid State Theory	3	0	0	3
PHY 830	Statistical Physics	2	1	0	3
PHY 823	Compulsory Elective	3	0	0	3
PHY 817	Elective	3	0	0	3
	TOTAL				21

THIRD SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 899	Master's Thesis Research Project	0	0	18	12
	TOTAL				12

COMPULSORY ELECTIVES FOR FIRST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 805	Properties of Materials	3	0	0	3
PHY 819	Chaotic Dynamics	3	0	0	3

ELECTIVES FOR SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 828	Non-Conventional Energy Sources	0	0	9	3
PHY 809	Solid State Devices Theory	3	0	0	3
PHY 810	Technology & Fabrication of Semiconductor Devices	2	1	0	3
PHY 811	Atomic & Molecular Theory	3	0	0	3
PHY 812	Technology of Semiconductor Materials	3	0	0	3

(b2) M.Tech in Electronic Measurement and Instrumentation

FIRST SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 801	Methods of Mathematical Physics	2	1	0	3
PHY 821	Quantum Mechanics	2	1	0	3
PHY 803	Electrodynamics	2	1	0	3
PHY 823	Computational Physics	2	0	3	3
PHY 817	Digital Electronics	2	0	3	3
	TOTAL				15

SECOND SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 804	Advanced Laboratory and Experimental Techniques	0	0	9	3
PHY 826	Electronic Measurements and Instrumentation	3	0	0	3
PHY 818	Control System Techniques	3	0	0	3
PHY 807	Advanced Electronics	3	0	0	3
	Elective	3	0	0	3
	TOTAL				15

ELECTIVES					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 850	Ionospheric Physics	3	0	0	3
PHY 856	Space Weather	3	0	0	3
PHY 858	Satellite Imagery	3	0	0	3
THIRD SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 899	Master's Thesis Research Project	0	0	18	12
	TOTAL				12

ELECTIVES					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 810	Technology and fabrication of semiconductor	3	0	0	3
PHY 812	Technology of semiconductor materials	3	0	0	3

THIRD SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 899	Master's Thesis Research Project	0	0	18	12
	TOTAL				12

(b3) M.Tech in Communication Physics

FIRST SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 801	Methods of Mathematical Physics	2	1	0	3
PHY 821	Quantum Mechanics	2	1	0	3
PHY 803	Electrodynamics	2	1	0	3
PHY 823	Computational Physics	2	0	3	3
PHY 817	Digital Electronics	2	0	3	3
	TOTAL				15

SECOND SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 804	Advanced Laboratory and Experimental Tech.	0	0	9	3
PHY 820	Satellite Technology	3	0	0	3
PHY 814	Radio wave Propagation	3	0	0	3
PHY 816	Antenna Theory	3	0	0	3
	Elective	3	0	0	3
	TOTAL				15

FIRST SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 801	Methods of Mathematical Physics	2	1	0	3
PHY 821	Quantum Mechanics	2	1	0	3
PHY 803	Electrodynamics	2	1	0	3
PHY 823	Computational Physics	2	0	3	3
PHY 817	Digital Electronics	2	0	3	3
	TOTAL				15

SECOND SEMESTER					
COURSE CODE	COURSE TITLE	L	T	P	U
PHY 804	Advanced Laboratory and Experimental Techniques	0	0	9	3
PHY 822	Radiation Detection and Spectroscopy	3	0	0	3
PHY 824	Advanced Nuclear and Energy Physics	3	0	0	3
PHY 826	Radiation Protection and Dosimetry	3	0	0	3
	Elective	3	0	0	3
	TOTAL				15

ELECTIVES						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 811	Atomic and Molecular Theory	3	0	0	3	
PHY 813	Physics of Diagnostic and Interventional Radiology	2	0	1	3	
PHY 815	Non-conventional energy sources	3	0	0	3	
PHY 846	Physics of Nuclear Medicine	3	0	0	3	
PHY 851	Physics of Medical Imaging	2		1	3	

ELECTIVES						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 856	Space Weather	3	0	0	3	
PHY 858	Satellite Imagery	3	0	0	3	
PHY 899	Master's Thesis Research Project	3	0	0	12	

THIRD SEMESTER						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 899	Master's Thesis Research Project	0	0	18	12	
	TOTAL					12

THIRD SEMESTER						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 899	Master's Thesis Research Project	0	0	18	12	
	TOTAL					12

(b5) M.Tech in Space Physics

FIRST SEMESTER						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 801	Methods of Mathematical Physics	2	1	0	3	
PHY 821	Quantum Mechanics	2	1	0	3	
PHY 803	Electrodynamics	2	1	0	3	
PHY 823	Computational Physics	2	0	3	3	
PHY 817	Digital Electronics	2	0	3	3	
	TOTAL					15

(b6) M.Tech in Atmospheric Physics

FIRST SEMESTER						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 801	Methods of Mathematical Physics	2	1	0	3	
PHY 821	Quantum Mechanics	2	1	0	3	
PHY 803	Electrodynamics	2	0	3	3	
PHY 823	Computational Physics	2	0	3	3	
PHY 817	Digital Electronics	2	0	3	3	
	TOTAL					15

SECOND SEMESTER						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 804	Advanced Laboratory and Experimental Techniques	0	0	9	3	
PHY 852	Ionospheric Physics	3	0	0	3	
PHY 850	Planetary Atmospheres	3	0	0	3	
PHY 854	Physics of Geomagnetic Phenomena	3	0	0	3	
	Elective	3	0	0	3	
	TOTAL					15

SECOND SEMESTER						
COURSE CODE	COURSE TITLE	L	T	P	U	
PHY 804	Advanced Laboratory and Experimental Techniques	0	0	9	3	
PHY 840	Physics of the Lower Atmosphere	3	0	0	3	
PHY 842	Fluid Dynamics	3	0	0	3	
PHY 844	Atmospheric Radiation	3	0	0	3	
	Elective	3	0	0	3	
	TOTAL					15

ELECTIVES

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 852	Ionospheric Physics	3	0	0	3
PHY 850	Planetary Atmospheres	3	0	0	3
PHY 858	Satellite Imagery	3	0	0	3

THIRD SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
PHY 899	Master's Thesis Research Project	0	0	18	12
TOTAL					12

(a) M.Phil

(d1) M.Phil. in Condensed Matter

FIRST SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 869	C	Fluid Dynamics	2	1	0	3
PHY 875	C	Properties of Materials	2	1	0	3
PHY 881	C	Statistical Physics	2	1	0	3
Total						9

SECOND SEMESTER

COURSE CODE		COURSE TITLE	L	T	P	UNITS
PHY 888	C	Solid State Theory	2	1	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 861		Advanced Nuclear and Energy Physics	3	0	0	3
PHY 868	E	Chaotic Dynamics	3	0	0	3
PHY 891	E	Technology and Fabrication of Semiconductor Devices	2	0	3	3
PHY 893	E	Technology of Semiconductor Materials	3	0	0	3
PHY 894	E	Non-Conventional Energy Sources	3	0	0	3
PHY 895	E	Atomic and Molecular Theory	3	0	0	3
PHY 896	E	Nanoscience and Technology	2	0	3	3

(d2) M. Phil. in Electronic Measurement and Instrumentation

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 863	C	Computational Physics	2	1	0	3
PHY 865	C	Digital Electronics	2	1	0	3
PHY 869	C	Fluid Dynamics	2	1	0	3
Total						9

SECOND SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 872	C	Electronic Measurements and Instrumentation	3	0	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 862	E	Advanced Electronics	3	0	0	3
PHY 870	E	Control Systems Techniques	3	0	0	3
PHY 891	E	Technology and Fabrication of Semiconductor Devices	2	0	3	3
PHY 893	E	Technology of Semiconductor Materials	3	0	0	3

M.Phil. in Communication Physics
FIRST SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 867	C	Electrodynamics	2	1	0	3
PHY 869	C	Fluid Dynamics	2	1	0	3
PHY 879	C	Radio wave Propagation	2	1	0	3
Total						9

SECOND SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 892	C	Satellite Technology	3	0	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 864	E	Antenna Theory	3	0	0	3
PHY 874	E	Ionospheric Physics	3	0	0	3
PHY 890	E	Space Weather	3	0	0	3

FIRST SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 867	C	Electrodynamics	3	0	0	3
PHY 869	C	Fluid Dynamics	2	1	0	3
PHY 871	C	Physics of Geomagnetic Phenomenon	3	0	0	3
Total						9

SECOND SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 874	C	Ionospheric Physics	3	0	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 890	E	Space Weather	3	0	0	3
PHY 878	E	Methods of Mathematical Physics	3	0	0	3
PHY 892	E	Satellite Technology	3	0	0	3
Total						9

(d4) M.Phil. in Atmospheric Physics
FIRST SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 869	C	Fluid Dynamics	2	1	0	3
PHY 873	C	Physics of the Lower Atmosphere	3	0	0	3
PHY 879	C	Radio wave Propagation	3	0	0	3
Total						9

SECOND SEMESTER

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 866	C	Atmospheric Radiation	3	0	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES

COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 880	E	Planetary Atmospheres	3	0	0	3
PHY 892	E	Satellite Technology	3	0	0	3
Total						9

(d5) M.Phil. in Radiation and Health/Medical Physics

FIRST SEMESTER						
COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 861	C	Advanced Nuclear and Energy Physics	3	0	0	3
PHY 869	C	Fluid Dynamics	2	1	0	3
PHY 877	C	Radiation Detection and Spectroscopy	3	0	0	3
Total						9

SECOND SEMESTER						
COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 886	C	Radiation Protection and Dosimetry	3	0	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES						
COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY876	E	Physics of Medical Imaging	2	1	0	3
PHY882	E	Physics of Nuclear Medicine	2	1	0	3
PHY883	E	Physics of Diagnostic and Interventional Radiology	3	0	0	3
PHY885	E	Physics of Radiation Oncology	3	0	0	3
PHY887	E	Radiation Physics	2	0	3	3
PHY889	E	Applied Dosimetry	2	0	3	3
PHY894	E	Non-Conventional Energy Sources	2	1	0	3
PHY895	E	Atomic and Molecular Theory	2	1	0	3
PHY897	E	Computers in Medical Imaging	2	1	3	4

(e) M.Phil. in Energy Physics

FIRST SEMESTER						
COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 861	C	Advanced Nuclear and Energy Physics	3	0	0	3
PHY 869	C	Fluid Dynamics	2	1	0	3
PHY 875	C	Properties of Materials	2	1	0	3
Total						9

SECOND SEMESTER						
COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 894	C	Non-Conventional Energy Sources	3	0	0	3
PHY 900	C	M. Phil. Research Project	0	0	18	6
	E	Elective Course	3	0	0	3
Total						12

ELECTIVE COURSES						
COURSE CODE	STATUS	COURSE TITLE	L	T	P	UNITS
PHY 868	E	Chaotic Dynamics	3	0	0	3
PHY 881	E	Statistical Physics	2	1	0	3
PHY 888	E	Solid State Theory	2	1	0	3
PHY 891	E	Technology and Fabrication of Semiconductor Devices	2	0	3	3
PHY 893	E	Technology of Semiconductor Materials	3	0	0	3
PHY 895	E	Atomic and Molecular Theory	3	0	0	3
PHY 896	E	Nanoscience and Technology	2	0	3	3

C COMPUSORY COURSE, E ELECTIVE COURSE

COURSE SYNOPSSES

(a) PGD

PHY 701 Mathematical Methods 3 Units
Methods of solving first order o.d.e., second order o.d.e. with constant coefficient. General theory of nth order linear equations. Laplace transform and its use to solve initial-value I problems. Simple treatment of partial differential equations independent variables. Application of o.d.e. to physical life. Special functions of mathematical physics e.g. gamma function, hypergeometric function, Legendre functions, Bessel's functions, Hermite and Laguerre functions, Dirac Deltafunction, Fourier series and transforms. Solution of boundary value problems of p.d.e. by methods of separation of variables and integral transforms Calculus of residues and its application to evaluation of integral and summation of series. Applications to various physical situations which include e.m. theory, quantum theory and diffusion phenomena. Techniques for the solution of boundary value problems. Use of Green's functions.

PHY 702 Electromagnetism 3 Units

Electromagnetic: Superposition, Coulomb's Law, electrostatic force etc. Cause Law and applications. Poisson laplace equations. Boundary value problems, Magnetostatics, static field and matter, electric and magnetic energy. Faraday's law. Moving charges in function fields. Maxwell's equations and applications. Introduction to spherical waves.

PHY 703 Analytical Mechanics 3 Units

Conservative forces and potentials, central forces problems. Rigid body dynamics, generalized motion, mechanics of continuous media. Degrees of freedom, generalized coordinates. Lagrange's formulation of mechanics applications. The calculus of variation and the action principles. Hamilton's formulation of mechanics and applications. Oscillatory systems, including damped, forced and coupled oscillations: Normal modes.

PHY704 Quantum Physics 3 Units

Formulation of quantum mechanics in terms of state vectors and linear operators. The theory of angular momentum and spin. Time-dependent and Time-independent perturbation theory. Scattering theory, elastic potential scattering. Green's function and partial wave methods. Selected phenomena from each of atomic physics, molecular physics, solid state physics and nuclear physics are described and interpreted using quantum mechanical models. Some aspects of quantum statistical mechanics.

PHY 705 Introductory Solid State Electronics 3 Units

Electrical conduction in metals and semiconductors. Energy barrier. Motion of charge in electric and magnetic fields. Hall effect. Photoelectric, thermionic and secondary electronic emission phenomena, effects and applications. Fabrication of electronic devices diodes, BJT, FET, Solar cells. Introduction to thin films. Application to IC manufacture.

PHY 706 Electrical Measurements and Instrumentation 3 Units

Principles of measurement errors, accuracy, Detailed working electrical/electronic instruments such as Q-meter, Watt-meter, C.R.O., Semiconductor tester, X-Y plotter, Digital and analogue meters, transducers and application, operational amplifiers, Introduction to the design of electronic equipment.

PHY 707 Electronics 3 Units

Logic gates AND, OR, NAND NOR, EX-OR, EX-NOT, flip-flop, Types of gates DTL, TTL, CMOS, NMOS, ECL, Logic outputs: Totem pole open collector, tristate Combination of systems. Boolean algebra. De Morgan's law, Karnaugh maps, Quine-Mc Cluskey method. Minimisation by computer. Digital switches. Multiplexers and De multiplexers. Counters-asynchronous and synchronous. Digital to analogue, analogue to digital converters.

PHY 708 Nuclear and Particle Physics 3 Units

Nuclear structure: Nuclear properties, nuclear size, nuclear masses, nuclear forces, nuclear-nucleon scattering: the deuteron. Nuclear models. Radioactive decay. Radiation and detectors spectroscopy. Neutron physics, fission and fusion. Nuclear reactor and nuclear energy. Elementary particles: Conservation laws, partial classification. Strong electromagnetic and weak interactions

PHY 709 Electronics Devices and Fabrication 3 Units

Fabrication, design and application of micro-circuits, IC technology, doping process, fabrication of simple devices, pn junction, LEDs, transistors etc.

PHY 710 Vacuum Physics and Thin Film 3 Units

Design and characterization of vacuum systems; different types of vacuum pumps and their uses, measurement of low pressure, different types of pressure gauges: use of valves and other vacuum materials. Industrial uses of vacuum systems, vacuum heating, furnaces, induction heating, electron bombardment heating. Vacuum evaporation by various means, evaporation sources and techniques substrate and surface preparation for thin film deposition in vacuum. Ephithaxial. Growth processes. Heath treatment of thin film, compatibility of films and substrates, sputtering techniques, deposition of thin insulating films by rf, sputtering preparation and use of masks for thin film deposition. Characterization and application of tl in films.

PHY 712 Energy Conversion and Storage 3 Units

Theory of modern energy conversion, transmission and storage methods; windmills, heat engines, classical engines, ocean thermal energy converters, thermoelectric thermionic, fuel cells, production of hydrogen, electrolytic, chemical thermolytic, photolytic, hydrogen storage, photoelectron

converters, photo themovoltaic, biomass, photosynthesis production of methanol and ethanol from vegetable matter.

PHY 799 PGD Research Project 6 Units
A research project in contemporary physics under the supervision of staff. A detailed report on the research is presented at the completion of the project.

(b) M.Tech.

PHY 801 Methods of Mathematical Physics (3 units)
Techniques for the solution of Boundary value problems, use of Green's functions, integral Equations; Vector Spaces; Tensor Transformations; Materials; Complex Variable theory, Group, Representations and symmetry.

PHY 803 Electrodynamics (3 Units)

Concept of potential and its applications; Single and multiple boundary value problems; The electromagnetic fields energy, forces and momentum relations; Maxwell's equations' solutions of the wave equation; Applications to radiating systems, Elements of relativistic electrodynamics, Moving charges, classical electron theory.

PHY 804 Advanced Laboratory and Experimental Techniques (3 Units)

Three projects in electronics and in basic physical techniques, e.g. vacuum techniques, optical instrumentation.

PHY 805 Properties of Materials (3 Units)
The structure of atoms; Bohr-Rutherford, Wave-mechanical models; Inter-atomic and molecular forces; X-ray crystallography; Crystal imperfections-point defect, line defects, dislocation mechanism of slip, role of dislocation, planar defects, atomic movements in solids.

PHY 806 Electronic Measurements and Instrumentation (3 Units)

Errors, Standards, accuracy and calibration; Relationship between specification and circuit performance; Analogue and digital measurements, Transducers and sensors; Signal conditioning, amplification, multiplexing sampling, digital to analogue and analogue to digital conversion. Noise in instrumentation systems; Data indication and recording storage, Signal electrical and optical characterization of signal crystals.

PHY 807 Advanced Electronics (3 Units)
Semiconductor diodes, transistors, special power semiconductor devices. Transistor circuits and amplifiers, power distortion, multistage amplifier feed-back and bandwidth. I.C devices and circuits, operational amplifiers, phase locked loops, gyrators, turned circuits active filters, detectors, logarithmic generators, variable gain devices; Analysis of circuits for generating, shaping and manipulation waveforms using elements such as line transformers and I.C's

PHY 808 Solid State Theory(3 Units)
Symmetry and group theory; Electron States, Self-consistent field approximations methods; the Semi-surface; Semi-

conductors and metals, the Kronig-Penny model, Dynamics of electrons and holes in semiconductors, Insulator bands, Impurity states; Scattering by resonance and impurities; Electronic properties; Thermodynamic, transport, semiconductor systems, screening, Dielectric properties; Optical properties; Lattice vibrations; Phonon and the lattice specific heat; Electron-phonon interactions, Superconductivity. Density functional theory and its applications.

PHY 809 Solid State Devices Theory (3 Units)
PN junction theory, homo and heterojunctions, metal-semiconductor junction; General characteristics and physical limitations of bipolar transistor; Relation of physical properties to electrical characteristics; Theory of junction-field effect transistor, Theory of insulated gate transistors; properties of the metal-oxide; semiconductor system and its applications in insulated gate field effect transistor. High field and bull effect devices. Theory of quantum mechanics; Time-dependent and time-independent approximation methods; Scattering theory.

PHY 810 Technology and Fabrication of Semiconductor Devices (3 Units)

Formation of PN junction; Formation of oxide and nitride layers on silicon; The photolithographic process; Oxide and nitride layers and diffusion masks; Formation of metal layers; Vacuum deposition; Ohmic contacts; Assemblymethods; Outline of technology of semiconductor diodes, transistors integrated circuits; Evaluation of the technology; in-process texts on finished devices.

PHY 811 Atomic and Molecular Theory (3 Units)

Quantum mechanical description of the hydrogen atom, electron spin, angular momentum vector and interaction; Radioactive transistions; ED approximation probability; Selection rules; The self-consistent field formations and the Hartre-Fork equations; Multiplex structure by Recah methods; Hyperfine couplings and isotope shift; Atoms on crystal lattices; The stark and Zeeman effects; Vibrational-rotational structure of diatomic polyatomic molecules; Molecular orbitals.

PHY 812 Technology of Semiconductor Materials (3 Units)

Methods of single crystal growth; Vacuum deposition of single crystal layers; Impurities and lattice defects in semiconductors. Properties of germanium and silicon and of selected A¹³B^v compounds GaAs, GaP, InSb, etc; Behaviour of impurities during crystal growth from the melt, Zone refining, controlled doping, preparation and growth of intermetallic semiconductor crystal; Mechanical electrical and optical characterization of single crystals.

PHY 814 Radio Wave Properties (3 Units)
Propagation mechanisms through the troposphere, Radio services; Quantifying propagation performance; Electromagnetic wave radiation, Line-of-sight and transhorizon propagation; Attenuation by atmospheric gases, noise, rain attenuation; Ionospheric propagation; Special

problems of hf radio communication associated with the equatorial ionosphere; Radio noise, Prediction techniques, Calculation and Measurement of field strength, power flux density, radiation and transmission loss.

PHY 815 Non-conventional Energy Sources (3Units)

Conventional and nonconventional energy sources; Biomass energy, energy storage in plants. Manufacture of synthetic fuel. Desertification and fuel wood conservation; Fossil energy; petroleum exploration; Energy consumption in industry, transportation and other sectors. Nuclear energy, nuclear reactions, nuclear fission and fusion, Reactor design, Efficient use of energy in small and medium forms. Waste utilization and recovery. Energy analysis and optimization; improving efficiency of power plants for production of electric energy. Energy planning.

PHY 816 Antena Theory (3 Units)

Antena: basis, construction and measurements; tuning, gain and radiation pattern measurement. Antena modification, types and characteristics, antenna radiation, reception, currents and polarization. Propagation in free space, effective radiative power, system performance, fading and variability, fading allowances, reliability, worst conditions.

PHY 817 Digital Electronics (3 Units)

Switching circuits, Gates, AND, OR, NOR AND NAND gates logic circuit designs. Sum of products and Products-of-sums expression, Karnaugh maps. Flip-flops. Arithmetic circuits, Adder and Substractors. Binary multipliers. Counter and counter application. Memory devices. Introduction to microprocessors and microcomputers.

PHY 818 Control Systems Technique (3 Units)

Control systems, representation, open loop and closed loop control. Transfer function, Steady state and transient behaviour of control system. Stability and sensitivity of control systems. Frequency response methods. Root-loans Method; Control System synthesis. Process control and controllers.

PHY 819 Chaotic Dynamics (3Units)

Concept of phase space, Poincare section, phase diagrams, Basins of attraction, Bifurcation diagrams, Simple chaotic maps: the Logistic map, the circle map, The horseshoe map, characterization of chaotic attractions, Lyapunov exponents, Chaos in fluid dynamics, Lasers, Chaos and quantum physics.

PHY 820 Satellite Technology (3 Units)

The scope and nature of scientific research using vehicles, orbits in a central gravitational field, dynamical requirements for launching earth satellites, rocket propulsion, the tracking of space vehicles; satellite remote Assembly methods; Outline of technology of semiconductor diodes, transistors integrated circuits; Evaluation of the technology; in-process texts on finished devices.

PHY 821 Quantum Mechanics (3 Units)

Quantum Mechanics of one particle system, Quantum mechanics of Heisenberg, Matrix mechanics and transformation theory of quantum mechanics, Theory of angular momentum and spin, Zeeman effect, Time dependent and time independent approximation methods and application, scattering theory, Dirac equation, low order radiation processes, relativistic quantum mechanics.

PHY 822 Radiation detection and Spectroscopy (3 Units)

Principles of radiation detection. Review of interaction of radiation with matter: Ionizations and excitations. Survey of detector types: Gas-filled, scintillation and semiconductor detectors. NaI (Tl) detector characteristics and resolving time. Liquid scintillation analyses, quenching, Solid state (semiconductor) detectors; the HpGe detectors, Photopeak efficiencies and multichannels pulse height analysis. Detectors resolutions. Measurement statistics, Nuclear analytical methods: Thermal and fast neutron activation: neutron sources and neutron reaction cross-sections, energy dependence, resonance. Neutron activation analysis and applications. X-ray fluorescence analysis, the yield equation, sources, domain of application, analytical parameters. Track analysis; principles fission and charge particle tracks, radio measurements. Isotope dilution and solvent extraction methods of radiometric analysis. Principles of the gamma and positron cameras.

PHY 823 Computational Physics (3 Units)

Numerical linear algebra, root finding, approximation theory, integration, ordinary differential equations, optimization techniques, initial and boundary value problems, finite element methods, direct and indirect methods in matrix theory, optimization with constraints analysis of numerical stability, computer programming.

PHY 824 Advance Nuclear and Energy Physics (3 Units)

Review of fundamentals of Nuclear Physics: the nuclear atom (Rutherford's model and the Bohr's modifications); Nuclear properties: nuclear structure and models; nuclear stability; nuclear moment, parity and statistics. Forces between nucleons: deuteron, nucleon-nucleon and proton-proton scattering. Nuclear reactions (scattering, collisions): conservation of physical quantities; Q-value determination; cross-sections; the Breit-Wigner formula; excited states of nuclei; nuclear decays: Alpha, beta and gamma decay processes. Theory of decays: quantum mechanical tunneling, the Gamow factor, X-rays following beta decay, the Fermi-theory of beta decay. Energetics of gamma decay: internal conversion: position annihilation: isomeric transitions: branching ratios and lifetimes of excited states. Spontaneous fission, Fusion and accelerators Elementary particle physics. Peaceful uses of nuclear energy techniques in Research, Industry, Medicine, Agriculture and the Environment.

PHY 826 Radiation Protection and Dosimetry (3 Units)

Radiation units and quantities. Environmental radiation. Environmental monitoring. Background and artificial sources of exposure. Radiation exposure pathways (external and internal exposures). Review of biological effects of radiation. Radiation risks (health effects). Principles of radiation protection. Legislation of radiation protection. Radiation shielding and protection. Attenuation coefficients and half-value thickness. Waste disposal and decontamination procedures. Principles of dosimetry. Dose conversion factors. Dose limits (for radiation workers and members of the general public). Microdosimetry. Primary and secondary dosimeters. Dose assessment techniques; Experimental, epidemiological and model calculations.

PHY 830 Statistical Mechanics (3 Units)

Statistical distribution functions, Canonical and grand canonical formalism, phase transition and fluctuations, irreversible thermodynamics, Exact transport theory, Principle of equipartition of energy, Canonical and microcanonical ensembles and their applications, statistical quantum physics, Ising model.

PHY 840 Physics of the Lower Atmosphere (3 Units)

Weather/meteorological parameters and their measurements, Atmospheric thermodynamics, geotropic wind and atmospheric oscillation, atmospheric radiation, cloud Physics and atmospheric electricity, satellite meteorology and remote sensing, Applications to West Africa.

PHY 842 Fluid Dynamics (3 Units)

Kinematics of fluid motion, Euler's equations, Bernoulli equation, steady flow of a compressible fluid, Irrotational motion for incompressible flow, gravity waves, waves in incompressible fluid, vortices, energy and momentum relationships, Flow in pipes and open channels, viscous flow, experimental methods in fluid dynamics.

PHY 844 Atmospheric Radiation (3 Units)

Fundamentals of radiation, absorption spectra of water vapour, carbon dioxide, ozone, and oxygen, solar ray path in the atmosphere, Rayleigh and Mie scattering phenomena, direct, diffuse and global irradiance, energy distribution in the solar spectrum outside the atmosphere and at the surface, solar time equation, temporal and spatial variability of solar radiation, theory of thermal radiation in the atmosphere, radiation charts, effects of infrared cooling, radiation balance and climate, Experimental techniques.

PHY 850 Planetary Atmospheres (3 Units)

Basic concepts of the Earth's atmosphere: Atmospheric nomenclature, hydrostatic equations, scale height, geopotential height; chemical concepts of the atmosphere; thermodynamic considerations, elementary chemical kinetics; composition and chemistry of middle atmosphere and

thermosphere; thermal balance in the thermosphere; modeling of neutral atmosphere. Dynamics of the Earth's atmosphere: Equation of motion of neutral atmosphere; thermal wind equation; elements of planetary waves; internal gravity waves and atmospheric tides; fundamental description of atmospheric dynamics and effects of dynamics on chemical species. Solar radiation and its effect on atmosphere: Solar radiation at the top of the atmosphere, attenuation of solar radiation in the atmosphere, radiative transfer, thermal effects of radiation, photochemical effects of radiation. Atmosphere of planets and satellites: Inner and outer planets; atmospheric structure and composition of the Moon, Jupiter, Mars, Venus and Saturn and their important satellites.

PHY 852 Ionospheric Physics (3 Units)

Introduction to ionosphere; photochemical processes; Chapman's theory of photoionization; production of ionospheric layers; loss reactios and chemistry of ionospheric regions; morphology of the ionosphere. Ionosspheric propagation and measurement techniques: Effect of ionosphere on radio wave propagation; refraction, dispersion and polarization; magneto-iossnic theory; critical frequency and virtual height; oblique propagation and maximum usable frequency; ground-based techniques – ionosonde; radars scintillations and total electron content (TEC), photometers, imagers and interferometers, ionospheric absorption; rocket- and satellite-borne techniques – Langmuir probe, electric field probe, retarding potential analysers, mass spectrometers, magnetometers, vapour release, satellite drag for neutral density. Ionosspheric plasma dynamics: Basic fluid equations; steady state ionospheric plasma motions owing to applied forces; generation of electric fields; electric field mapping; collision frequencies; electrical conductivity; plasma diffusion; ionospheric dynamo; equatorial electrojet; ionospheric modeling. Ionospheres of other planets and satellites. Ionospheres of Mars, Venus and Jupiter.

PHY 854 Physics of Geomagnetic Phenomena (3 Units)

Elements of solar physics: Structure and composition of the Sun, the Sun as a source of radiation; sunspots and solar cycles; solar flares. Magnetic field of the Earth and other planets: Models for generation of geomagnetic fields; secular variations of geomagnetic fields; local elements of geomagnetic fields; determinations of geomagnetic coordinates of stations; Transients various of geomagnetic fields; diurnal variation of geomagnetic fields; geomagnetic pulsations; magnetic fields of other planets. Equatorial anomaly. Magnetosphere of the Earth and other planets: Solar wind and its characteristics; interplanetary magnetic field and sector structure; formation of geomagnetic cavity, magnetopause; magnetospheath and bow shock; polar cusp and magnetotail; plasma sphere and Van Allen radiation belts; magnetosphere of other planets. Geomagnetic field modeling. Aurora and Airglow: Nightglow; dayglow; twilight glow; aurora; applications of airglow measurements for ionospheric dynamics and composition.

PHY 856 Space Weather (3 Units)

Elements of space weather: Geomagnetic storms, sub-storms and current systems; coronal mass ejections; modification of earth's magnetosphere during magnetic disturbances and its implications; effect of magnetic disturbance on high, mid and low latitudes. Measurement techniques for solar and geomagnetic parameters: optical techniques for solar parameters; radio techniques for solar parameters; X-ray; Space Missions. Space Weather Prediction: Modeling of Space Weather parameters.

PHY 858 Satellite Imagery (3 Units)

Overview of remote sensing technology; history and evolution. Electromagnetic radiation and its interaction with matter. Spectral characteristics of crop/vegetation, soils, water etc. Remote sensing platforms, sensors and ground systems. Satellite remote sensing: classification by orbit, application, advantage and disadvantages, type of observation, orbital dynamics. Types of satellites. Overview of Earth observation satellites. Overview of optical infrared (IR) remote sensing sun-synchronous satellites. Overview of polar platforms and meteorological satellites; high-resolution satellites; radar satellites; other missions. Imaging technology. Photogrammetry. GPS: concepts, techniques, systems and applications: GIS concepts, principles and applications; GIS models, GIS components, inputs to GIS; GIS database design and organization; integration in GIS, querying in GIS, GIS outputs and visualization, accuracy of data in GIS, GIS integration errors.

PHY 899 Master's Thesis Research Project (12 Units)

Theoretical/Experimental project supervised by qualified lecturer(s) in the relevant field of interest in the various options (b1-b7) leading to a certified thesis to be defended at the end of the programme.

(C) M.Phil.**PHY 861 Advanced Nuclear and Energy Physics (3 Units)**

Review of fundamentals of Nuclear Physics: the nuclear atom (Rutherford's model and the Bohr's modifications); Nuclear properties: nuclear structure and models; nuclear stability; nuclear moment, parity and statistics. Forces between nucleons: deuteron, nucleon-nucleon and proton-proton scattering. Nuclear reactions (scattering, collisions): conservation of physical quantities; Q-value determination; cross-sections; the Breit-Wigner formula; excited states of nuclei; nuclear decays: Alpha beta and gamma decay processes. Theory of decays: quantum mechanical tunneling the Gamow factor. X-rays following beta decay the Fermi theory of beta decay. Energetics of gamma decay: internal conversion: positron annihilation: isomeric transitions: Branching ratios and lifetimes of excited states. Spontaneous fission Fusion and accelerators Elementary particle physics. Peaceful uses of nuclear energy techniques in Research Industry, Medicine, Agriculture and the Environment.

PHY 862 Advanced Electronics (3 Units) Semiconductor diodes, transistors. special power semiconductor devices. Transistor circuits and amplifiers, power distortion, multistage amplifier feed-back and bandwidth. I.C. devices and circuits: I.C: operational amplifiers, phase locked loops, gyrators. turned circuits active filters, detectors, logarithmic generators, variable gain devices; Analysis of circuits for generating, shaping and manipulating waveforms using elements such as line transformers and IC.'s.

PHY 863 Computational Physics (3 Units) Numerical linear algebra, root finding, approximation theory integration, ordinary differential equations, optimization techniques, initial and boundary value problems

finite element methods, direct and indirect methods in matrix theory, optimization with constraints analysis of numerical stability, computer programming.

PHY 864 Antenna Theory (3 Units)

Antenna: basis, construction' and measurements; tuning, gain and radiation pattern measurement. Antenna modifications, types and characteristics; antenna radiation, reception, currents and polarization. Propagation in free space, effective radiative power, system performance, fading and variability, fading allowances, reliability, worst conditions.

PHY 865 Digital Electronics (3 Units)

Switching circuits, Gates, AND, OR NOR and NAND gates logic circuit designs. Sum of products and Products-of-sums expression, Karnaugh maps. Flip- Flops. Arithmetic circuits, Adder and Subtractors. Binary multipliers. Counters and counter application. Memory devices. Introduction, to digital Computer, operation. Introduction to microprocessors' and microcomputers.

PHY 866 Atmospheric radiation (3 Units)

Fundamentals: of radiation, absorption spectra of water vapour, carbon dioxide, ozone, and oxygen, solar path in the atmosphere, Rayleigh and Mie scattering phenomena, direct, diffuse and global irradiance, energy distribution in the solar spectrum outside the atmosphere and at the surface, solar time equation, temporal and spatial variability of solar radiation, theory of thermal radiation in the atmosphere, radiation charts, effects of infrared cooling, radiation balance and climate, Experimental technique.

PHY 867 Electrodynamics (3 Units)

Concept of potential and its applications; Single and multiple boundary value problems; The electromagnetic fields energy, forces and momentum relations; Maxwell's equations' solutions of wave equation; Applications to radiating systems, Elements of relativistic electrodynamics, ring charges, classical electron theory

PHY 868 Chaotic Dynamics (3 Units)

Concept of phase space, Poincare section, phase diagrams, Basins of attraction, Bifurcation diagrams, Simple chaotic maps: the Logistic map, the circle map. The horseshoe map, characterization of chaotic Attractors, Lyapunov exponents. Chaos in fluid dynamics, Lasers, Chaos and quantum physics.

PHY 869 Fluid Dynamics 3 Units)

Kinematics or fluid motion, Euler's equations, Bernoulli equation, steady flow of a compressible fluid, irrotational motion for incompressible flow, gravity waves, waves in incompressible fluids, vortices, energy and momentum relationships Flow in pipes and open channels, viscous flow, experimental methods in fluid dynamics

PHY 870 Control Systems Technique (3 Units)

Control systems, representation, open loop and closed loop control. Transfer function, Steady state and transient behaviour of control system. Stability and sensitivity of control systems. Frequency response methods. Root-loans Method; Control Systems synthesis. Process control and controllers.

PHY 871 Physics of Geomagnetic Phenomena (3 Units)

Elements of Solar physics: Structure and composition of the Sun; the Sun as a source of radiation; suns pots and solar cycles; solar flares. Magnetic field of the earth and other planets: Models for generation of geomagnetic fields; secular variations of geomagnetic fields; local elements of geomagnetic fields; determinations of geomagnetic coordinates of stations; Transients variations of geomagnetic fields; diurnal variation of geomagnetic fields; geomagnetic pulsations; magnetic fields of other planets. Equatorial anomaly. Magnetosphere of the Earth and other planets Solar wind and its characteristics; interplanetary magnetic field and sector structure formation of geomagnetic cavity, magnetopause; magnetosheath and bow shock; polar cusp and magnetotail; plasma sphere and Van Allen radiation belts; magnetosphere of other planets. Geomagnetic field modeling. Aurora and Airglow: Nightglow; day glow; twilight glow; aurora; applications of airglow measurements for ionospheric dynamics and composition.

PHY 872 Electronic Measurements and Instrumentation (3 Units)

Errors, Standards, accuracy and calibration; Relationship between specification and circuit performance; Analogue and digital measurements, Transducers and sensors; Signal conditioning, amplification, multiplexing sampling, digital to analogue and analogue to digital conversion. Noise in instrumentation systems; Data indication and recording, storage, Signal electrical and optical characterization of signal crystals.

PHY 873 Physics of the Lower Atmosphere (3 Units)

Weather/meteorological parameters and their measurements, Atmospheric thermodynamics, air stability, geotropic wind and atmospheric oscillation, atmospheric

radiation cloud Physics and atmospheric electricity, satellite meteorology and remote sensing Applications to West Africa.

PHY 874 Ionospheric Physics (3 Units)

Introduction to ionosphere; photochemical processes; Chapman's theory of photoionization; production ionospheric layers; loss reactions and chemistry of ionospheric regions; Morphology of the ionosphere, Ionospheric propagation and measurement techniques: Effect of ionosphere on radio wave propagation; refraction, dispersion and polarization; magneto-ionic theory; critical frequency and virtual height; oblique propagation and maximum usable frequency; ground-based techniques-ionosonde; radars; scintillations and total electron content (TEC), photometers, imagers and interferometers, ionospheric absorption; rocket- and satellite borne techniques Langmuir probe, electric field probe, retarding potential analysers, mass Spectrometers, magnetometers, vapour release, satellite drag for neutral density. Ionospheric plasma dynamics: Basic fluid equations; steady state ionospheric plasma motions owing to applied forces; generation of electric fields; electric field mapping; collision frequencies; electrical conductivity; plasma diffusion; ionospheric dynamo; equatorial electrojet; ionospheric modeling. Ionospheres of other planets and satellites. Ionospheres of Mars, Venus and Jupiter.

PHY 875 Properties of Materials (3 Units)

The structure of atoms; Bohr-Rutherford, Wave-mechanical models; Inter-atomic and molecular forces; X-ray crystallography; Crystal imperfections-point defect, line defects, dislocation mechanism of slip, role of dislocation, planar defects, atomic movements in solids.

PHY 876 Physics of Medical Imaging (3 Units) Fundamentals of Medical Imaging:

Mathematical Methods in Medical Imaging; Tomographic Reconstruction Techniques; Linear Systems; Acquisition, formation, processing and display of medical images; Perception; Evaluation of Image Quality

Physics of Imaging Detectors (Basics): Introduction to Poisson statistics; Physics of generic photon detectors (Quantum efficiency -Direct conversion detectors, Charge generation and charge collection Indirect conversion detectors); Scintillators (Integrating detectors, Counting detectors, Spectroscopic detectors); Sampling (Space, Time); Noise considerations (Signal to noise ratio); Photon transfer curve; Concept of spatial frequency depending detective quantum efficiency (Integrating detectors, Counting detectors)

PHY 877 Radiation detection and Spectroscopy (3 Units)

Principles of radiation detection. Review of interaction of radiation with matter: Ionizations and excitations. Survey of detector types: Gas-filled, scintillation and semiconductor detectors. NaI(Tl) detector characteristics and resolving

time; Liquid scintillation analyses, quenching. Solid state (semiconductor) detectors. Photopeak efficiencies and multichannel: pulse height analysis. Detectors resolutions. Measurement statistics. Nuclear analytical methods: Thermal and fast neutron activation; neutron sources and neutron reaction cross-sections, energy dependence, resonance. Neutron activation analysis and applications. X-ray fluorescent analysis, the yield equation, sources, domain of application, analytical parameters. Track analysis; principles; fission and charged particle tracks, radon measurements. Isotope dilution and solvent extraction methods of radiometric analysis. Principles of the gamma and positron cameras.

PHY 878 Methods of Mathematical Physics (3 Units)
Techniques for the solution of Boundary value problems, use of Green's functions, integral Equations; Vector Spaces, Tensor Transformations; Materials; Complex variable theory, Groups Representations and symmetry.

PHY 879 Radio Wave Propagation (3 Units)

Propagation mechanisms through the troposphere, Radio services, Quantifying propagation performance. Electromagnetic wave radiation, Line-of-sight and transhorizon propagation. Attenuation by atmospheric gases, noise, rain attenuation. Ionospheric propagation, Special problems of hf radio communication associated with the equatorial ionosphere. Radio noise, Prediction techniques, Calculation and Measurement of field strength, power flux density, radiation and transmission loss.

PHY 880 Planetary Atmosphere (3 Units)

Basic concepts of the Earth's atmosphere: Atmospheric nomenclature, hydrostatic equations, scale height geopotential height; chemical concepts of the atmosphere; thermodynamic considerations, elementary chemical kinetics; composition and chemistry of middle atmosphere and thermo ere; thermal balance in the thermosphere; modeling of neutral atmosphere. Dynamics of the Earth's atmosphere: Equation of motion of neutral atmosphere; thermal wind equation; elements of planetary waves; internal gravity waves and atmospheric tides; fundamental description of atmospheric dynamics and effects of dynamics on chemical species. Solar radiation and its effect on atmosphere: Solar radiation at the top of the atmosphere, attenuation of solar radiation in the atmosphere, radiative transfer, thermal effects of radiation, photochemical effects of radiation. Atmospheres of planets and satellites: Inner and outer planets; atmospheric structure and composition of the Moon, Jupiter, Mars, Venus and Saturn and their important satellites.

PHY 881 Statistical Physics (3 Units)

Statistical distribution functions Canonical and grand canonical formalism phase transition and fluctuations, irreversible thermodynamics Exact transport theory Principle of equipartition of energy. Canonical and microcanonical ensembles and their applications statistical

quantum physics, Ising model.

PHY 882 Physics of Nuclear Medicine (3 Units)
Introduction to Nuclear Medicine. Basics of Atomic and Nuclear Physics. Modes of Radioactive Decay. Decay of Radioactivity. Radionuclide production. Interactions of Radiation with Matter. Radiation Detectors. Visible Light detectors. Nuclear Radiation Measurements – Scintillation

Counting Systems. Nuclear Radiation Measurements – Pulse-Height Spectrometry. Gamma camera –

Basic Properties. Gamma camera – Performance Characteristic. Tomographic Reconstruction in

Nuclear Medicine. Single Positron Emission Tomography (SPECT). Positron Emission Tomography

(PET). radiopharmaceuticals for Radiotherapy. Internal radiation Dosimetry. Glucose metabolism at the cellular level and Wartburg effect

PHY 883 Physics of Diagnostic and Interventional Radiology (3 Units)

X-Ray: Overview of Imaging Modalities (ionizing and non-ionizing); X ray Imaging (Generation of x-rays , x-ray spectra, Detectors, Image Parameters, Image quality, Noise, contrast, resolution, Radiographic, Mammography, Fluoroscopic, CT, DECT, Tomosynthesis, Interventional Radiology, Dual energy imaging and absorptiometry, Patient dose and system optimization); Dual and Multi-modality Imaging; Quality Management of Diagnostic and Interventional Radiology

Ultrasound Imaging: Acoustic properties of biological tissues; Wave, motion and propagation, acoustic power; Modes of Scanning; Transducers; Doppler; Safety.

Magnetic Resonance Imaging (MRI): Physics of Magnetic Resonance; MR Image formation; MR Instrumentation; MRI methods; MR contrast and image quality; Clinical applications and artefacts; Safety

PHY 884 Quantum Mechanics (3 Units)

Quantum mechanics of one particle system, Quantum mechanics of Heisenberg, Matrix mechanics and formation theory of quantum mechanics, Theory of angular momentum and spin, Zeemant effect, Time dependent and time independent approximation methods and applications, scattering theory, Dirac equation, low order radiation processes, relativistic quantum mechanics.

PHY 885 Physics of Radiation Oncology (3 Units)

Overview of clinical radiotherapy, Radiation therapy equipment (accelerators, cobalt 60, cyclotrons, kV generators); Basic photon radiation therapy (dosimetric functions, etc.); Basic treatment planning; Simulation, virtual simulation, DRR's, image registration; Patient setup, including positioning and immobilization; ICRU Reports 50, 62 and 83; Basic electron radiation therapy, ICRU Report 71; Kilovoltage radiotherapy; Dose calculation algorithms

and heterogeneity corrections; Brachytherapy, ICRU Report 38 , AAPM TG 43 formalism (HDR/LDR, Equipment, Treatment Planning); Inverse Planning, optimization, IMRT; Small field dosimetry (fundamental aspects, protocols); Small-field radiotherapy equipment and techniques (Stereotactic Radiotherapy and Radiosurgery, Stereotactic Body Radiotherapy, Intensity Modulated Radiotherapy; Image guidance and verification in radiotherapy (Cone beam CT, ultrasound, Portal imaging, in-vivo dosimetry, image registration); Radiation therapy information systems; Acceptance testing and commissioning; Quality management of radiotherapy

PHY 886 Radiation Protection and Dosimetry (3 Units)

Radiation units and quantities. Environmental radiation. Environmental monitoring. Background and artificial sources of exposure. Radiation exposure pathways (external and internal exposures). Review of biological effects of radiation. Radiation risks (health effects). Principles of radiation protection. Legislation of radiation protection. Radiation shielding and protection. Attenuation coefficients and half-value thickness. Waste disposal and decontamination procedures. Principles of dosimetry. Dose conversion factors. Dose limits (for radiation workers and members of the general public). Microdosimetry. Primary and secondary dosimeters. Dose assessment techniques; Experimental epidemiological and model calculations.

PHY 887 Radiation Physics (3 Units)

Review of modern physics and elementary quantum mechanics, Coulomb scattering, Elastic scattering, Rutherford, Multiple scattering: Molière, Goudsmit-Saunders, Scattering power, Atomic structure and models, Production of x-rays, Photon interactions - exponential attenuation, Thomson scattering, Compton Scattering, Rayleigh scattering, Photo-electric effect, Pair production, Annihilation, Photonuclear reactions, Overview of neutron interactions, Energy transfer and energy absorption, Stopping power for protons & electrons, Transport equation and Monte Carlo Techniques for radiation transport, introduction, Radiation dosimetry concepts, exposure, air kerma, CPE, Radiation Standards for air kerma and absorbed dose, Fricke dosimetry, Calorimetry, Cavity theory, Ionization chambers, recombination and polarity theory, Ngas concept and calibration chain

PHY 888 Solid State Theory (3 Units)

Symmetry and group theory; Electron States, Self-consistent field approximations methods; the Fermi surface; Semiconductors and metals, the Kronig-Penny model, Dynamics of electrons and holes in semiconductors. Insulator bands, Impurity states; Scattering by resonance and impurities; Electronic properties, Thermodynamic, transport, semiconductor systems, screening, Dielectric properties; Optical properties; Lattice vibrations; Phonon and the lattice specific heat; Electron-phonon interactions.

Superconductivity. Density functional theory and its applications. PN junction theory, homo and heterojunctions, metal-semiconductor junction; General characteristics and physical limitations of bipolar transistor; Relation of physical properties to electrical characteristics; Theory of junction-field effect transistor; Theory of insulated gate transistors; properties of the metal-oxide; semiconductor system and its applications in insulated gate field effect transistor. High field and bull effect devices. Theory of quantum mechanics; Time-dependent and time-independent approximation methods; Scattering theory. optimization; improving efficiency of power plants for production of electric energy. Energy planning.

PHY 889 Applied Dosimetry (3 Units)

Introduction to radiation therapy and dosimetry; percent depth dose curves. Radiation therapy equipment: Therapy devices; source-to-surface distance vs. source-to-axis distance; linear accelerator components. Linear accelerator components; other medical accelerators; beam quality definition. Measurement dosimetry: Calibration chain; absolute dosimeters; relative dosimeters; review of cavity theory. Air kerma based dosimetry. Absorbed dose to water based dosimetry, Dosimetric functions: Equivalent field size; inverse-square law; collimator factor; scatter factor; relative dose factor; peak scatter factor. Output at reference conditions; tissue-air ratio; scatter-air ratio; relationship between PDD and TAR; Mayneord factor. Tissue-phantom ratio; tissue-maximum ratio; relationship between PDD and TPR Calculation of dose to water under changing conditions (field size, SSD, depth) using PDD and TPR methods; monitor unit calculations for SSD and SAD setups. Treatment planning: Off- axis ratios; beam profiles; flatness and symmetry; isodose lines; dose distributions for single and multiple fields. Missing tissue compensation; wedges; bolus; compensators. Dose-volume histograms; beam weighting; dose normalization; radiotherapy prescriptions. CT simulation; digitally-reconstructed

Radiographs: Electron therapy: PDD; beam quality; practical range; low vs. high energies; virtual source; electron cutouts. Field matching; effect of obliquity; shielding; total skin electron irradiation; electron arc therapy; bolus; electron prescriptions. Kilovoltage radiotherapy: Free-air chambers; kilovoltagedosimetry; historical applications; current clinical applications

PHY 890 Space Weather (3 Units)

Elements of space weather: Geomagnetic storms, substorms and current systems; coronal mass ejections; modification of the Earth's magnetosphere during magnetic disturbances and its implications; effect of magnetic disturbance on high, mid, and low latitudes. Measurement techniques for solar and geomagnetic parameters: Optimal techniques for solar parameters; ratio techniques for solar parameters; X-ray; Space Missions. Space Weather Prediction: Modeling of Space Weather parameters.

PHY 891 Technology and Fabrication of Semiconductor Devices (3 Units)

Formation of PN junction, Formation of oxide and nitride layers on silicon, The photolithographic process; Oxide and nitride layers and diffusion masks, Formation of metal layers, Vacuum deposition. Ohmic contacts, Assembly methods, Outline of technology of semiconductor diodes, transistors, integrated circuits, Evaluation of the technology; in-process texts on finished devices.

PHY 892 Satellite Imagery (3 Units)

Overview of remote sensing technology: history and evolution. Electromagnetic radiation and its interaction with matter. Spectral characteristics of crops/vegetation, soils, water etc, Remote sensing platforms, sensors and ground systems. Satellite remote sensing: classification by orbit, applications, advantages arid disadvantages, type of observation, orbital dynamics. Types of satellites. Overview of Earth observation satellites. Overview of optical infrared (IR) remote sensing sun-synchronous satellites. Overview of polar platforms and meteorological satellites; high resolution satellites; radar satellites; other missions. Imaging technology. Photogrammetry. GIS concepts, techniques, systems and applications. GIS: concepts, principles and applications: GIS models, GIS components, inputs to GIS; GIS database design and organization; integration in GIS querying in GIS, GIS outputs and visualization, accuracy of data in GIS, GIS integration.

PHY 893 Technology of Semiconductor Materials (3 Units)

Methods of single crystal growth; Vacuum deposition of single crystal layers. Impurities and lattice defects in semiconductors. Properties of germanium and silicon and of selected A₃B_y compounds, GaAs, GaP, InSb, etc. Behaviour of impurities during crystal growth from the melt. Zone refining controlled doping, preparation and growth of inter-metallic semiconductor crystal. Mechanical, electrical and optical characterization of single crystals.

PHY 894 Non Conventional Energy Sources (3 Units)

Conventional and non-conventional energy sources; Biomass energy, energy storage in plants. Manufacture of synthetic fuel. Desertification and fuel wood conservation, Fossil energy, petroleum exploration. Energy consumption in industry, transportation and other sectors. Nuclear energy, nuclear reactions, nuclear fission and fusion, Reactor design, Efficient use of energy in small and medium forms. Waste utilization and recovery. Energy analysis and optimization; improving efficiency of power plants for production of ele ctric energy. Energy planning.

PHY895 Atomic and Molecular Spectroscopy (3 Units)

The hydrogen atom, the Bohr's theory, the Bohr-Sommerfeld theory, the energy of elliptical orbits. The Relativistic correction and its effects. Electron spin and the vector model of the atom. Identical particles and symmetry.

Many-electron atoms, coupling scheme. The diatomic molecule, hyperfine structure, Zeeman effects, Frand-Condon principle. Properties of x-rays. Microwave Spectroscopy, resonance phenomena, nuclear magnetic resonance (NMR), ES, optical pumping and Mossbauer Effect.

PHY 896 Nano Science and Technology (3 Units)

Introduction and classification; concept of nanoscience, nanomaterials and nanoscale. Description of nanomaterials; bottom-up, top-bottom, quantum mechanics of nanodimension (quantum dot).

Statistics of small essemles; molecular transport and thermodynamics. Nanoscale momentum and energy transfer; ballistic/diffusive transport. Surface and interface interactions; adhesion, surface tension, lubrication. Nanophase materials; design, synthesis and characterization. Nanodevice thermal and fluiding managements. Nanoscale biometric devices and system. Nanoscale sensing; nanometrology and actuation. Nanosystem energy conversion. Nano-manufacturing; challenges and opportunities.

PHY 897 Computers in Medical Imaging (4 Units)

Computers and networking: Introduction to computer systems and networks. General computer network concepts and terminology. Computer components and software. Operating systems. Network types and models. **Physical media for networks.** Different types of network media. Use of each medium and combinations. **Data link layer.** Error correction. Polynomial (CRC) checking code. Data link protocols. **Medium access sublayer** Collision detection and CSMA. Ethernet and IEEE 802.3. Other networks. And protocol comparisons. Switches and bridges. Troubleshooting hardware issues.**Network layer.** Static and dynamic routing. Internet protocol. IP address space. Classes of IP addresses. Gateways. ARP and RARP. DHCP. Subnets and routing tables. Troubleshooting IP problems. **Transport layer.** Functions of the transport layer. TCP and ports. UDP. **Application layer.** Name resolution. Network applications (FTP, email, security and firewall). **Clinical software and applications.** Imaging applications and image file formats. DICOM and DICOMRT standard and exchange. PACS. HL7. Relational databases.

Computer programming: Review of Computer Hardware/Software brief history. Programming

Languages (PL). PL Building Blocs (variables, Data types and expressions, looping, making decisions, arrays, functions, logic language/flow chart). Algorithm design (Diagram/flow chart). Type and Choice of language. Graphical User Interfaces GUIs. Intro to Real Basic language IDE. **Example projects:** memory handling, array and variables, I/O concepts, binary vs. text files, file type, structure/class organization, object-oriented programming concept (OOP), GUI design. **More**

example projects: advanced graphics, threading, shell calls, RNG, numerical methods, sampling techniques, etc...

**PHY 900 Master's of Philosophy Research Project
(6 Units)**

Theoretical/Experimental project supervised by qualified lecturer(s) in the relevant field of interest in the various options leading to a certified thesis to be defended at the end of the programme.

(d) Ph.D.

PHY 999 Doctoral Research Project

The candidate is expected to undertake a research project of interest in any field of physics. The candidates is expected to deliver three seminars on the proposal and on the research project undertaken.

LIST OF STAFF				
S/N	Name	Status	Qualification	Area of Specialization
1	O.S. Ajayi	Professor /HOD	B.Sc., M.Sc. (Ibadan), Ph.D. (Akure)	Radiation and Health/Communication Physics
2	I. A. Fuwape	Professor	B.Sc., M.Sc., Ph.D. (Ibadan)	Condensed Matter/Theoretical Physics
3	M. O. Ajewole	Professor	B.Sc., M.Sc. (Ilorin), Ph.D. (Akure)	Communication Physics
4	A. M. Arogunjo	Professor	B.Sc. (Ilorin), M.Sc. (Ibadan), Ph.D. Akure	Radiation and Health/Medical Physics
5	B. Adeyemi	Professor	B.Sc.(Ed), M.Sc., Ph.D. (Ilorin)	Atmospheric Physics
6	E. O. Ogolo	Professor	B.Sc. (Ed) (Ife), M.Sc., Ph.D. (Ibadan)	Atmospheric Physics
7	S. S. Oluyamo	Professor	B.Sc., M.Sc. (Ibadan), PGDE (Ife), Ph.D. (Ibadan)	Condensed Matter/Energy Physics
8	S. E. Falodun	Professor	B.Sc. (Benin), M.Tech, Ph.D. (Akure)	Communication Physics
9	K. D. Adedayo	Reader	B.Tech., M.Tech., Ph.D. (Akure)	Communication Physics / Instrumentation
10	T. Ewetumo	Senior Lecturer	B.Tech., M.Tech., Ph.D. (Akure)	Communication Physics / Instrumentation
11	J. S. Ojo	Senior Lecturer	B.Tech., M.Tech., Ph.D. (Akure)	Communication Physics
12	A. T. Adediji	Senior Lecturer	B.Sc. (Ilorin), M.Tech., Ph.D. (Akure)	Communication Physics
13	A. I. Popoola	Senior Lecturer	B.Tech., M. Tech. (Akure), Ph.D (Witwaterstrand)	Condensed Matter Physics/Instrumentation
14	O. P. Faromika	Senior Lecturer	B.Tech. (Akure), M.Sc. (Ibadan), Ph.D. (Akure)	Radiation and Health/Medical Physics
15	Y. A. Odusote	Lecturer I	B.Sc. (Ago-Iwoye), M.Sc. Ph.D (Ibadan)	Condensed Matter/Theoretical Physics
16	S. B. Ibikunle	Lecturer I	HND, PGD, M.Tech. (Akure), Ph.D (Akure)	Radiation and Health/Medical Physics
17	O. I. Olusola	Lecturer II	B.Tech. (Akure), M.Sc.(Ibadan), Ph.D. (Sheffield)	Condensed Matter/Energy Physics
18	I. O. B. Ogunsuwa	Lecturer II	B.Sc. (Akungba-Akoko), M.Sc.(Ibadan), Ph.D (Akure)	Space Physics
19	I. Emmanuel	Lecturer II	B.Tech, M.Tech. Ph.D. (Akure)	Atmospheric Physics
20	A. O. Adelakun	Lecturer II	B.Sc. (Abeokuta), M.Sc. (Ibadan), Ph.D. (Abeokuta)	Condensed Matter/Theoretical Physics

9.6.8 DEPARTMENT OF STATISTICS (STA)

1. PROGRAMMES OFFERED

- a) Postgraduate Diploma (PGD.) in Statistics
- b) Master of Technology (M. Tech.) in Statistics
- c) Doctor of Philosophy (Ph. D.) in Statistics

2. AVAILABLE OPTIONS/SPECIALIZATION

- i) Postgraduate Diploma in Statistics
- ii) M. Tech Statistics
- iii) PhD Statistics

3. THE PHILOSOPHY/ OBJECTIVES OF THE PROGRAMME

a.) Postgraduate Diploma (PGD) in Statistics

The Philosophy of the Programme:

The course is designed basically for university graduates with limited statistics background who wish to further their knowledge in statistics and also to serve as a bridge for H.N.D. Statistics graduates who might wish to improve on their academic and professional qualification. The course will provide students with a solid foundation in advanced statistical theory and methodology that are needed in social and applied sciences.

The objectives of the programme are to:

- i Acquire training in the Mathematical background and statistical methodology needed for data analyze.
 - ii Acquire competence and effectiveness in analyzing data using modern computing software.
 - iii Develop the ability to communicate effectively with researchers in the social, biomedical, agricultural and behavioral sciences, as members of an interdisciplinary team
 - iv Develop skills as a statistical consultant.
- b.) Master of Technology (M. Tech) & Doctor of Philosophy (Ph. D) in Statistics**

The Philosophy of the Programme

The programme is designed to equip students with adequate knowledge and skills in Statistics with focus on application in solving real life and industrial problems. Emphasis is placed on the following areas of specialization:

- (i) Operation Research
- (ii) Stochastic Processes.
- (iii) Time Series Analysis.
- (iv) Experimental Design.
- (v) Statistical Modelling.
- (vi) Econometric Methods

4 The objectives of the programme are to:

- (i) To develop and give academic and professional training in all areas of Statistics for the development of latent power of thinking of individuals.
- (ii) To provide and promote sound basic practical and theoretical training in Statistics as foundation for

technological development in Nigeria.

- (iii) To identify the basic scientific and technological problems in area of Statistics and find appropriate solutions to them.
- (iv) To provide students with basic knowledge in Statistics to solve real-life problems in areas of agriculture, commerce, industry, medicine and other disciplines that requires the knowledge of Statistics.
- (v) To give training for the purpose of job placement in the industries for self-actualization.
- (vi) To develop and offer academic and professional programmes as a foundation for post-graduate studies.
- (vii) To offer service courses in Statistics to other Departments in the University.

ADMISSION REQUIREMENTS

A. POSTGRADUATE DIPLOMA IN STATISTICS

Candidates for admission to the programme shall be holders of:

- (i) First degree of Federal University of Technology, Akure (FUTA) or any other recognized University in Physical, Biological, Applied and Social Sciences not below Third Class Honours
- (ii) Higher National Diploma (HND) (*Not Below Lower Credit*) in Statistics, Physical, Biological, Applied and Social Sciences.
- (iii) Any other qualification adjudged by senate to be equivalent to a first degree of the Federal University of Technology, Akure. (e.g. graduate of institute of statisticians).
- (iv) All other common regulations for the Postgraduate Diploma of the Federal University of Technology, Akure and the School of Sciences shall also be applicable

B. M.TECH. (STATISTICS) PROGRAMME

Basic Admission Requirements for M.TECH degree in statistics

Candidates for M.TECH Statistics admission must satisfy the following conditions:

- (a) A prospective student must meet the degree requirements of the postgraduate school of the Federal University of Technology, Akure. Each student must hold a good Bachelor degree of Statistics of any recognized University with a minimum of second class Honour (lower division) with a CGPA not less than 2.4/5.0

C. DOCTOR OF PHILOSOPHY (PH.D.) PROGRAMME IN STATISTICS

Basic Admission Requirements for Doctoral degree in statistics

Candidates for Ph.D. in Statistics admission must satisfy the following conditions:

All candidates shall be subjected to qualifying entrance examination when necessary. (Candidates with First class honour of the department of Statistics of The Federal University of Technology, Akure, shall be exempted from the qualifying entrance examination).

6 DURATION OF THE PROGRAMME

A. POSTGRADUATE DIPLOMA IN STATISTICS

The programme is expected to run on a Full-time basis for a minimum of Three (3) semesters and a maximum of five (5) semesters.

B. M.TECH. & Ph. D PROGRAMMES

The M.Tech. Programme is expected to last for a minimum 18 months and a maximum of 24 months full time. The first two semesters of the M.Tech. Programme will be devoted to course work. The third semester will be devoted mainly to supervised Thesis on a special area of real life problem

The Ph.D programme shall run for a minimum 36 months and a maximum of 48 months of intensive research for full time and a minimum of 48 months and a maximum of 72 months for part-time students. .

7. DEGREE REQUIREMENTS FOR GRADUATION

A. POSTGRADUATE DIPLOMA IN STATISTICS

To be eligible for the award of the PGD in Statistics, a candidate must have:

i. Passed all core courses and successfully completed the project work and Passed a minimum of 30 credit units, made up as follows:

- (a). 15 credit units in core courses.
- (b). 9 credit units in elective courses
- (c) 6 compulsory credit units of Research Projects

ii. Fulfilled all other conditions as may be specified by the Academic Board of SPGS of Federal University of Technology, Akure

M.TECH AND Ph.D. DEGREE PROGRAMMES

i. M.TECH IN STATISTICS

To be awarded a Master's degree, candidate must pass a minimum of 42 credit units made up as follows:

- a.) Core courses 34 credit units, including the general courses, Project and seminars.
- b.) Elective courses of 9 credit units.

- c.) A Student shall present at least one seminar, submit and defend a Thesis proposal
- d.) A Student shall carry out research in a relevant area of specialization and submit an acceptable thesis (12 credit units compulsory) which must be defended before a panel of external and internal examiners.

ii Ph.D. DEGREE IN STATISTICS

Doctorate (Ph.D.) programmes should primarily be by Research. However, Departmental Postgraduate committee may prescribe some courses of not more than 12 credit units to be taken by the candidates. A Doctoral (Ph.D.) Thesis of 12 credit units **MUST** be defended before a panel of Internal and External Examiners. The student will be required to:

- a. Complete an approved Research program of at least six semesters
- b. Present at least two seminars, submit and defend a thesis proposal on his research topic before an additional one on completion of the research work.
- c. Complete a doctoral thesis and pass an oral examination. Demonstrate adequate knowledge of the basic concepts and techniques of the option chosen
- e. Show high intellectual achievement in the oral examination.

**POSTGRADUATE DIPLOMA IN STATISTICS
FIRST SEMESTER**

COURSE CODE	COURSE TITLE	L	T	P	U
MTS 701(C)	Mathematical Methods I	2	1	0	3
MTS 703 (C)	Operations Research	2	1	0	3
MTS 705(C)	Probability and Distribution Theory	2	1	0	3
MTS 707(C)	Statistical Inference I	2	1	0	3
MTS 709(E)	Econometric Methods	2	1	0	3
MTS 711(E)	Official Statistics	2	1	0	3
	Total				18

c = compulsory e = elective

SECOND SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
MTS 702(C)	Interactive Data Analysis	2	1	0	3
MTS 704(C)	Design and Analysis of Experiments	2	1	0	3
MTS 708(C)	Statistical Inference II	2	1	0	3
	One Elective	2	1	0	3
	Total				12

ELECTIVE COURSES

COURSE CODE	COURSE TITLE	L	T	P	U
MTS 706(E)	Statistical Decision Theory	2	1	0	3
MTS 710(E)	Stochastic Processes	2	1	0	3

c = compulsory e = elective

THIRD SEMESTER

COURSE CODE	COURSE TITLE	L	T	P	U
MTS713(C)	Multivariate Analysis	2	1	0	3
MTS799	Project	0	0	18	6
	Two Electives				6
	Total				15

ELECTIVE COURSES

COURSE CODE	COURSE TITLE	L	T	P	U
MTS717(E)	Biometry	2	1	0	3
MTS719(E)	Time Series Analysis	2	1	0	3
MTS 721(E)	Sample Survey	2	1	0	3

C = Compulsory E = Elective

MASTERS DEGREE PROGRAMME

COURSE CODE	COURSE TITLE	L	T	P	U
MTS 821(C)	Advanced Statistical Methods I	3	-	-	3
MTS 822(C)	Advanced Statistical Methods II	3	-	-	3
MTS 823(E)	Sampling theory	3	-	-	3
MTS 824(C)	Experimental Design	3	-	-	3
MTS 825(E)	Time Series Analysis	4	-	-	4
MTS 826(E)	Statistical Decision Theory	3	-	-	3
MTS 827(C)	Statistical Computing	1	1	3	3
MTS 828(E)	Stochastic Processes	3	-	-	3
MTS 829(E)	Biometry	3	-	-	3
MTS 830(E)	Econometric Methods	3	-	-	3
MTS 831(E)	Multivariate Analysis	3	-	-	3
MTS 832 (E)	Operations Research	3	-	-	3
MTS 834(C)	Departmental Seminar	-	-	6	2
MTS 899(C)	Master's Thesis Research Project	-	-	36	12

COURSE SYNOPSSES
POST GRADUATE DIPLOMA
MTS 701 – Mathematical Methods I (3 units)

Sets, Relations, Mapping, One-one- Onto, Into, Composite mapping, Real numbers, integers, rational and irrational numbers. Sequences and Series. Theory of Quadratic equations. Binomial theorem. Algebra of Matrices, Linear transformation and their representations by Matrices.

MTS 702 – Interactive Data Analysis (3 units)

Introduction to statistical packages and computer aided learning. Exploratory data analysis, High resolution graphics, TQM. Elements of sampling theory, Power and sample size determination, Computing using standard batch-style and interactive packages and modern statistical languages, Factors, Tables, Regression, Analysis of Variance; Analysis of Variance of orthogonal and non orthogonal designs, Linear logistic modeling. The use of modern computers for the management of Statistical Information Systems. The complete flow of Information from the recording to the missing or incomplete data, Statistical database management, Practical exercises designed to give the students experience of real-life data analysis. Current version of the following packages S-PLUS, QSB, LINDO, EPI – INFO, GENSTAT, STATISTICA, SPSS and E-VIEWS will be taught.

MTS 703 – Operations Research (3 units)

Deterministic and Probabilistic models. Linear programming methods, non-linear integer and dynamic programming with applications inventory and stock control. Application of stochastic processes e.g. queuing theory or Simulation techniques, Games theory and network analysis, Transportation problem, Markov chain, Application of decision analysis in dynamic programming, competitive and search problems

MTS 704 Design and Analysis of Experiments (3 units)

Analysis of Standard designs, Complete and Incomplete designs, Latin Square designs, Nested designs and other crossed classification designs, Comparison of the various designs, Factorial experiments, Confounding and fractional replication, Response surface designs and evolutionary operation in industries properties and estimation of parameters under various sampling methods e.g. simple random stratified and optimum allocation, ratio and regression estimates, Problems in the planning and execution of sample surveys.

MTS 705 – Probability and Distribution Theory (3units)

Sample Space, Algebra of Sets, Axiomatic definitions of Probability, Conditional Probability and Independence, Bayes theorem, Random Variables and their distributions. Moment and Probability generating functions. Some special distributions, Marginal and Conditional

distributions, Multivariate Continuous distributions of functions of random variables and some derived distribution. Limit theorems and limiting distributions.

MTS 706 – Statistical Decision Theory(3units)

Binary Decisions: Single and Multiple observations; Maximum Likelihood Decision criterion, Neyman-Pearson criterion, Probability-of-Error criterion, Bayes Risk criterion, Vector observations, General Gaussian problem. Multiple Decisions; Erasure Decision problems. Sequential Decision Theory; Binary Erasure criterion, Sequential Bayes Tests, the Wald Sequential Test, Average Sample Number. Composite and Nonparametric Decision Theory; Composite Decisions, Sign Test

MTS 707 - Statistical Inference I (3 units)

Unbiased estimation.Crammer-Rao Inequality and its generalizations.Bhattacharyabounds.SufficientStatistics.Rao-Black well theorem. Complete Statistics. Halmos theorem on uniformly minimum Variance estimation.Maximum likelihood estimators.Linear estimation Minimum risk and Bayes estimation.Admissible and minimax estimators using quadratic loss. Invariant estimators.Interval estimation.Neyman–Pearson theory, randomized and non-randomized tests, most powerful and uniform most powerful tests.S Unbiased tests and Confidence Intervals, Completeness and Similarity.Likelihood ratio tests.The principle of Invariance, Invariant tests.

MTS 708 – Statistical Inference II (3units)

Point and Interval estimation methods. The methods of Maximum likelihood, Methods of Moments, Least Square Methods, Criteria and Properties of estimates, Unbiaseness, Efficiency, Sufficiency and Completeness. Tests of hypothesis, power function, Nearman –Pearson lemma, likelihood ratio and sequential tests.Decision theory and Bayesian Inference, Non-parametric Inference, Correlation and regression analysis. Analysis of Variance and Multivariate analysis

MTS 709 – Econometric Methods (3 units)

Introduction to Linear and general economic models and multiple regression on economic situations, Single equation, non-linear models, Simultaneous equations econometric models, Time Series models, Model

building and fitting, Auto-regression models, Application of models in production and consumption and models of nation and economy.

MTS 710 – Stochastic Processes (3 units)

Random phenomena in time and space, Markov chains in discrete and continuous time, Classification of states, Stationary distributions, Branching processes, Renewal theory including regenerative processes and Semi-Markov processes, Brownian motion and stationary processes, queuing theory. Problems of censuses and population statistics.Registration and measures of vital event.Life table,

statistical problems in epidemiology.

MTS 711 – Official Statistics (3 units)

Collection and analysis of data arising from economic and social planning. The methods of analyses will include the parametric and nonparametric statistical methods. Source and Nature of Official Statistics like economic, social, population (birth, death, emigration and immigration), education and so on, Problems in collecting and analysis of these data.

MTS 713 – Multivariate Analysis (3 units)

Vector Valued random Variables, Linear and Stochastic independence, Expectations of quadratic Forms, Multivariate normal distribution, linear and quadratic Forms, Wishart and Hotelling T² distributions, Wilk's lambda, Noncentral F, t and x² distributions, Estimation of mean vector and Covariance matrix, Maximum likelihood, Bayesian and robust estimation methods, Missing data, Likelihood ratio and the union intersection principles, Simultaneous confidence intervals, partial and multiple correlation, Estimation, Distribution and Testing.

MTS 717- Biometry (3 units)

Biological assays; direct assays.Dose response relationship. Multiple assays, statistical analysis of DNA sequences. MANOVA, splits plot design. ANOVA (1-Factor, 2-Factors ,...n-Factors Experiments), Post-hoc tests, Model for categorical repeated measurement. Multivariate Analysis:- additive main effects and multiplicative interaction model. Various methods of analyzing biological and agricultural data.

MTS 719 – Time Series Analysis (3 units)

General stationary, Non stationary models, Autoco-variance and auto correlation functions. Stationary, non-stationary autoregressive integrated moving average models. Frequency-based techniques of time series analysis, Spectral theory, Linear filters, Estimation of Spectra, Estimation of transfer functions, Design, system identification, Forecasting in linear models, Vector valued stationary processes, Model building, Hilbert space techniques, Linear systems and optimal control. Use of statistical computer packages.e.g. E – VIEWS and TSAP .

MTS - 799 PGD Research Project (6 units)

Candidates shall be required to submit a written project report under staff supervision to the department for examination.

M.TECH

MTS 821 Advanced Statistical Methods 1(4 units)

Limit theorems. Convergence of sequence of variables and distribution function limiting distribution. Generating functions and inverse theorems, special parametric univariate and multivariate distribution, sampling distribution and large sample theory. Further theory of statistical inference.

MTS 822 Advanced Statistical Methods 11 (3 Units)

Application of least square regression theory to the analysis of variance and regression analysis. Nonparametric and

sequential method .analysis of qualitative data. Bayesian method.

MTS 823 Sampling theory (3 Units)

Survey designs: simple random sampling, stratified random sampling, cluster sampling, multistage sampling, Systematic sampling, theory of estimation, sampling with probability proportional to size .ratio and regression estimates, optimisation techniques for minimum variance or cost,optimal sampling design ,cost and variance functions .comparisons of randomisation and prediction models for inference in finite population ,use of auxiliary variables in sample selection and estimation, stratification, clustering, balance and robustness ordered and Unordered estimators sampling strategy. Unified theory of sampling.

MTS 824 Design And Analysis Of Experiments (3 units)

General Linear Models;Generalized inverse of a Matrix, Factorial Experiment; Symmetric and Asymmetric; Balanced and Partially Balance incomplete Block Design, Resolvable, Row-Column designs. Response Surface Methodology, Constructions of Design, non-linear mapplications Nesting, blocking, split-plots, nested, crossovers and Latin squares, power and sample response surface methods, orthogonal design, empirical, model building, non-linear models and its applications.

MTS 825 Time Series Analysis (3 Units)

General stationary, non stationary models, auto-covariance functions stationary, non-stationary autoregressive integrated moving average models. Frequency based techniques of time series analysis, Spectral theory statistical , Unit root and Cointegration, Kilmer filter Estimation criteria and methods including compound bays and min-max, admissibility, test of hypothesis-uniformly most powerful tests, unbiasness, invariance confidence and tolerance interval

MTS 826 Statistical Decision Theory (3 Units)

Estimation criteria and methods including constituency, sufficiency, efficiency, min-max, admissibility, test of Hypothesis –uniformly most powerful tests, unbiasness, invariance, confidence and tolerance intervals, Sequential sampling test.

MTS 827 Statistical Computing (3 Units)

Introduction to statistical packages and computer aided learning. Exploratory data analysis, high resolution graphics, TQM, elements of sampling theory, power and sample size determination, computing using standard batch-style and interactive packages and modern statistical languages, factors, tables, regression, analysis of variance, analysis of variance of orthogonal and non-orthogonal designs, linear logistics modelling. The use of modern computers for the management of statistical information systems, the complete flow of information from the recording to the missing or incomplete data, statistical database management, practical exercise designed to give the students experience of real life data analysis current version of the following packages:

PLUS, QSB, LINDO, EPI-NFO, GENSTAT, STATISTICA, SPSS, E-VIEWS etc. will be taught.

MTS 828 Stochastic Processes (3 Units)

General theory of processes, sample function properties, weak convergence, Martingales and applications, random walks, fluctuation theory, Brownian motion, diffusion processes, Levy processes, Gaussian processes, stochastic differential equation, method of generating function weak convergence and central limit theorems. Applications in Engineering, Physics, Biology, Hydrology and Operations Research.

MTS 829 Biometry (3 Units)

Biological assay: Direct assays, Fieller's theorem, dilution assays. Dose-response relationships. Parallel line and stop ration assays. Assays based on quantal responses. Quantitative genetics: Mendelian principles, Hardy-Weinberg law. Inheritance of binary characters. Inheritance of continuous traits. Sexlinkages. Covariation between relatives. Genotypic and environmental variance. Heritability: inheritance of human disease, intelligence. Plant and animal breeding. Covariance Structure: modified split plot analysis; MANOVA and ante-dependence analysis; model for categorical repeated measurements; random coefficient regression models.

MTS 830 Econometric Methods (3 Units)

Implication of the use of large endogenous variables and nonlinear specifications in simulation, interpretation of large scale macro models, economic models. Economic models, statistical inference, Linear and non linear models and estimation, statistical analysis of economic time series, autoregressive and distributed lag models, simultaneous equation models, identification and estimation, Bayesian inference relating to single equation linear and non linear, multivariate econometric model.

MTS 831 Multivariate Analysis (3 Units)

Graphical exploration and representation of multivariate data. Model based and model free dimensionality reduction. Multivariate general linear model, multivariate analysis of variance, general random an fixed effects formulations, particular designs including split plot and repeated, measures regression and prediction. Smoothing methods, principal component analysis, canonical correlation, discriminant

MTS 832 Operations Research (3 Units)

Deterministic and Probabilistic models. Linear programming methods, non-linear integer and dynamic programming with applications, inventory and stock control. Applications of stochastic processes e.g. queuing theory or simulation techniques, games theory and network analysis, transportation problem, Markov chain. Application of decision analysis in dynamic programming, competitive and search problems. Markovian process and probabilistic dynamic programming

MTS 834 Departmental Seminar (2 Units)

MTS 899 Master's Thesis Research Projects (12 Units)

Students shall be required to submit a written project under staff supervision

and significant contributions to the understanding and knowledge of Statistics. The report should be presented in form of a thesis using approved format. Every candidate must present, at least, two successful seminars before submission of Ph. D thesis report for examination

THE PHD DEGREE IN STATISTICS

MTS 999 Doctoral Research Project (12 Units)

Original research project, which must involve independent investigations in any of the listed fields, should make new

LIST OF STAFF

S/N	NAME OF STAFF	RANK	SPECIALIZATION	GSMNO.
1.	Prof. Kayode. Ayinde	Professor	Econometrics, Non-Parametric and Semi-Parametric Statistics	08035850519
2.	Dr. O. A. Fasoranbaku	Reader	Econometrics	08033932972
3.	Dr. F. B. Adebola	Senior Lecturer	Sample Survey	08038380448
4.	Dr. A. S. Ajiboye	Senior Lecturer	Operations Research	08038506608
5.	Dr. A. A. Akomolafe	Senior Lecturer	Statistical Inference / Applied Sample survey	08039137435
6.	Dr. O.A Adeoti	Senior Lecturer	Quality Control	08034239587
7.	Dr. O. O. Alabi	Senior Lecturer	Econometrics	08035807226
8.	Dr. Ezra. Gayawan	Lecturer I	Biostatistics/ Spatial Statistics	08034184407
9.	Dr. O.S. Makinde	Lecturer II	MultivariateParametric Statistics	08185463053
10.	Dr. A. O. Adepetun	Lecturer II	Sample Survey	07068110449