PROF. FRANCIS CHUKWUEMEKA EZE
B.Sc. (Nig.), M.Sc. (Dundee), PhD (Nig.), Member, New York Academy of Sciences, Member of American Physical Society, Member, Institute of Physics (London), FIIAN, FSESN, FNIP, KSJI, JP.
VICE CHANCELLOR
FEDERAL UNIVERSITY OF TECHNONOGY, OWERRI

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

DEPARTMENTAL HANDBOOK/BROCHURE

DEPARTMENT OF COMPUTER SCIENCE

NAME OF UNIVERSITY
FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

NAME OF VICE-CHANCELLOR
PROFESSOR.FRANCIS CHUKWUEMEKA EZE, **KSJI, JP.**
B.Sc. (Nig.), M.Sc. (Dundee), PhD (Nig.),
Member, New York Academy of Sciences, Member of American Physical Society, Member, Institute of Physics (London), FIIAN, FSESN, FNIP.

NAME OF SCHOOL
SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

NAME OF DEAN OF SCHOOL
ENGR. PROF. (MRS) GLORIAA. CHUKWUDEBE,
FNSE, FNCS, FNIEEE, SMIEEE

NAME OF DEPARTMENT
COMPUTER SCIENCE

NAME OF HEAD OF DEPARTMENT
DR. E. C. NWOKORIE, MNCS, MCPN, MIEEE, MACM,
(B,Sc (UNN), M.Sc.(UPH),Ph.D (UPH))

DATE OF ESTABLISHMENT OF DEPARTMENT
OCTOBER, 2008

TABLE OF CONTENTS

COURSE CONTENTS

100 LEVEL COURSES

BIO 101: GENERAL BIOLOGY I (2 0 1)
CHM 101: GENERAL CHEMISTRY I (2 1 1)
CHM 102: GENERAL CHEMISTRY II (2 1 1)
ENG 101: WORKSHOP PRACTICE I (0 0 1)
ENG 102: WORKSHOP PRACTICE II (0 0 1)
ENG 103: ENGINEERING DRAWING I (0 0 1)
ENG 104: ENGINEERING DRAWING II (0 0 1)
FRN 101: FRENCH LANGUAGE I (1 0 0)
FRN 102: FRENCH LANGUAGE II (1 0 0)
GST 101: USE OF ENGLISH I (1 1 0)
GST 102: USE OF ENGLISH II (1 1 0)
GST 103: HUMANITIES (1 0 0)
GST 108: POLITY AND ECONOMY OF NIGERIA (1 1 0)
GST 110: SCIENCE, TECHNOLOGY AND SOCIETY (1 0 0)
IGB101: INTRODUCTION TO IGBO GRAMMAR, COMPOSITION AND COMPREHENSION (1 0 0)
IGB 102: INTRODUCTION TO IGBO HISTORY, CULTURE AND LITERATURE (1 0 0)
MTH 101: ELEMENTARY MATHEMATICS I (3 1 0)
MTH 102: ELEMENTARY MATHEMATICS II (3 1 0)
PHY 101: GENERAL PHYSICS I (2 1 1)
PHY 102: GENERAL PHYSICS II (2 1 1)

200 LEVEL COURSES

PHY 201: APPLIED ELECTRICITY 1 (2 1 0)
ENG 201: WORKSHOP PRACTICE III (0 0 1)
GST 201: NIGERIAN AND AFRICAN CULTURAL DEVELOPMENT SOCIAL SCIENCE II (1 0 0)
MTH 201: MATHEMATICAL METHODS I (2 1 0)
MTH 202: MATHEMATICAL METHODS II (2 1 0)
MTH 203: ELEMENTARY DIFFERENTIAL EQUATION I (2 1 0)
MTH 204: ELEMENTARY DIFFERENTIAL EQUATION II (2 1 0)
STA 211: INTRODUCTION TO STATISTICS AND PROBABILITY (2 1 0)
STA 212: PROBABILITY AND RANDOM VARIABLES (2 1 0)
MTH 222: NUMERICAL METHODS (2 1 0)
CSC 201: COMPUTER AND APPLICATIONS I (2 1 1)
CSC 202: COMPUTER AND APPLICATIONS II (2 0 1)
CIT 202: COMPUTER PROGRAMMING I (1 0 1)
CIT 204: COMPUTER ARCHITECTURE AND ORGANIZATION I (1 0 1)
CSC 204: FUNDAMENTALS OF CYBER SECURITY II (1 1 0)
CSC 208 INTRODUCTION TO DATABASE DESIGN AND APPLICATIONS (1 1 0)
CSC 203: FUNDAMENTALS OF CYBER SECURITY I (1 1 0)

300 LEVEL COURSES

ENS 301: INTRODUCTION TO ENTREPRENEURSHIP AND INNOVATION (2 0 0)
ENS 302: BUSINESS CREATION, GROWTH AND CORPORATE GOVERNANCE (2 0 0)
PHY 303: APPLIED ELECTRICITY II(2 1 0)
MTH 303: REAL ANALYSIS I (2 1 0)
MTH 304: REAL ANALYSIS II (2 1 0)
STA 311: INTRODUCTION TO STATISTICAL INFERENCE (2 1 0)
CSC 302: COMPUTER ARCHITECTURE AND ORGANIZATION II (2 0 0)

CIT 302: COMPUTER PROGRAMMING II (2 0 1)
CSC 303: COMPUTER SYSTEMS LABORATORY (1 0 1)
CIT 304: DATABASE MANAGEMENT SYSTEMS DESIGN I (2 0 1)
CIT 305: INTRODUCTION TO SOFTWARE ENGINEERING (1 0 1)
CSC 305: DATA STRUCTURES AND ALGORITHMS (2 0 0)
CSC 312: OBJECT-ORIENTED PROGRAMMING (1 0 1)
CIT 301: OPERATING SYSTEMS I (1 0 1)
CIT 303: SYSTEM ANALYSIS AND DESIGN (2 1 0)
CSC 307: STRUCTURED PROGRAMMING (1 0 1)
CSC 310: OPERATING SYSTEMS II (1 0 1)
CSC 309: DISCRETE STRUCTURES (2 1 0)
CSC 304: COMPILER CONSTRUCTION I (1 0 1)
CSC 311: STATISTICAL COMPUTING (1 0 1)
CSC 306: ASSEMBLY AND MACHINE LANGUAGE PROGRAMMING (2 0 1)
CIT 306: WEB DESIGN AND PROGRAMMING I (2 0 1)
CSC 308: INTRODUCTION TO THEORY OF COMPUTING (2 1 0)

400 LEVEL COURSES
CSC 401: SURVEY OF PROGRAMMING LANGUAGES (1 0 1)
CIT 401: DATABASE MANAGEMENT SYSTEMS DESIGN II (2 0 1)
CSC 403: COMPUTER HARDWARE SYSTEMS DESIGN (1 0 1)
CSC 405: ALGORITHMS AND COMPLEXITY ANALYSIS (2 0 0)
CSC 407: COMPUTER AND SOCIETY (2 0 0)
CSC 409: HUMAN COMPUTER INTERFACE DESIGN (1 0 1)
CSC 411: COMPUTER APPLICATIONS IN OPERATIONS RESEARCH (2 0 1)
IFT 405: RESEARCH METHODOLOGY & CAPSTONE MANAGEMENT (2 0 0)
CSC 413: NUMERICAL COMPUTATIONS (1 0 1)
STA 451: DESIGN AND ANALYSIS OF EXPERIMENTS I (2 1 0)
CSC 415: MOBILE COMPUTING SYSTEMS DESIGN (1 0 1)
CSC 417: EMBEDDED SYSTEMS AND FIRMWARE DESIGN (1, 0, 1)
CSC 419: COMPILER CONSTRUCTION II (1 0 1)
CSC 421: DATABASE SYSTEMS PROGRAMMING (2 0 1)
CSC 423: CONCURRENT SYSTEMS PROGRAMMING (2 0 1)
CSC 501: SOFTWARE ENGINEERING (2 0 1)
CSC 502: FORMAL MODELS OF COMPUTATION (2 0 1)
CSC 503: INFORMATION SYSTEM MANAGEMENT (2 1 0)
CSC 504: COMPUTER GRAPHICS AND VISUALIZATION (2 0 1)
CSC 505: ALGORITHMIC TECHNIQUES FOR SMART SYSTEMS (2 0 0)
CSC 506: COMPUTER NETWORKS AND COMMUNICATION (2 0 1)
CSC 507: DATA COMMUNICATION SYSTEMS DESIGNS (1 0 1)
CSC 508: SYSTEM PERFORMANCE EVALUATION (2 1 0)
CSC 509: NET-CENTRIC COMPUTING AND DATA SECURITY (1 0 1)
CSC 510: COMPUTER MODELLING AND SIMULATION (2 0 1)
CSC 511: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (2 0 1)
CSC 512: THE INTERNET OF THINGS (1 0 1)
CSC 513: DATA MINING & BIG DATA ANALYSIS (2 0 1)
CSC 514: SPECIAL TOPICS IN SOFTWARE ENGINEERING (2 0 1)
CSC 515: MICROPROCESSOR ARCHITECTURE (2 0 1)
CSC 516: CRYPTOGRAPHY ALGORITHMS AND APPLICATIONS (2 0 1)
CSC 517: DISTRIBUTED COMPUTING SYSTEM DESIGN (2 0 1)
CSC 519: TOPICS IN INFORMATION TECHNOLOGY (2 1 0)
CSC 521: ORGANIZATION OF PROGRAMMING LANGUAGES (2 0 0)

CSC 555/556: PROJECT (0 0 6)
STA 501: STOCHASTIC PROCESSES (2 1 0)
STA 502: DECISION THEORY (2 1 0)
STA 513: SAMPLING THEORY AND SURVEY METHODS II (2 1 0)

7.3 ACADEMIC STAFF

7.4 NON-TEACHING STAFF

7.4.1 ADMINISTRATIVE STAFF

7.4.2 TECHNICAL STAFF

1.0 INTRODUCTION

Computer Science is one course that presently impacts all disciplines. It is the study of computers and computational systems and processes. It enables the use of algorithms and programs to manipulate, store, process, and communicate digital information. The advances in computer science have spurred dramatic innovations in microelectronics and data communication which inturn haveled to a revolution in the use of computer systems for numerous applications in all fields of endeavour;education, communication, business, government, medicine, transportation, researchand publication, etc.

With the increasing demand for improved productivity and performance, Computer Science has evolved to becomea big umbrella covering many trending fields such as Artificial Intelligence, Computer Graphics, Computer Networks, Software Engineering, Database Management Systems, Cloud Computing, Cybersecurity, Internet of Things (IoT), etc.

1.1 History of Computer Science Department

The Computer Science programme in FUTO evolved fromtheDepartment of Mathematics and Computer Science in 2007, subsequent to a successful resource verification exercise by the National Universities Commission (NUC). At the inception of the Federal University of Technology Owerri in October 1981, Industrial Mathematics was one of the pioneer programmes.Then it was headed by a Coordinator who worked under the supervision of the Director of Physical Sciences programme in the School of Natural and Applied Sciences (SNAS). This later became the School of Earth, Minerals and Natural Sciences (SEMNS). Following the National Universities Commission (NUC) Seminar held in Kaduna in September 1988, on courses offered by the Federal Universities of Technology in the country and the subsequent decision to operate a departmental structure, the new Department of Mathematics and Computer Science was approved by Senate to award B.Tech. Degree (Mathematics and Computer Science) with options in Pure Mathematics, Industrial and Applied Mathematics, Statistics and ComputerScience under the School of Physical Sciences.In 2007, the former Department of Mathematics and Computer Science split into three departments: Mathematics, Computer Science and Statistics. Since creation, the following has headed Computer Science Department: Dr. Fabian Uzoh. (2007 - 2011), Prof. Simeon ChiomaInyama(2012 - 2014), Prof. E. N. Erumaka. (2015 - 2018) and Dr. (Mrs.) E. C. Nwokorie (2018 - date).

1.2 ACADEMIC CONTENT

Existing Curriculum for the Programme / Sub-Discipline / Discipline
Attach to this Form, the complete and current prospectus which should include:

(a) Programme Title: DEPARTMENT OF COMPUTER SCIENCE
(b) Programme / Sub-Discipline / Discipline Philosophy, Aims/Objectives and Career Opportunities:

2.0 PHILOSOPHY,AIMS/OBJECTIVES/ CAREER OPPORTUNITIES

2.1 PHILOSOPHY OF THE PROGRAMME

The philosophy underlying the B.Tech Computer Scienceprogramme is training of students to acquire adequate theoretical and applied knowledge for self-employment or employment in the public and private sectors in the country or abroad. This is to be achieved through:

a. Practical exposure to problem solving and development ofcomputer programsfor societal problems.
b. Developing entrepreneurial knowledge for self-reliance.
c. Creating an awareness and understanding of the moral, ethical, legal, and professional obligations to global society as regards the development and use of computer systems.
d. Creating a conduce environment for proficiency in effective communication, teamwork skills, out-of-the-box thinking and innovation.

2.2AIMS/OBJECTIVES

The aim of the programme is to produce graduates with a broad knowledge and practical skills in Computer Science. The general objectives include the following:

a. Provision of sound and broad-based training in Computer Science in response to the national need for skilled innovative computer technocrats for national development.
b. Provision of functional standard hardware and software laboratories and infrastructures for teaching and research.
c. Production of graduates with highly specialized, widely applicable, locally and globally relevant marketable skills for the industry and other aspects of computing.
d. Production of graduates who can be self-employed and employment creators.
e. Production of required manpower that will not only be used in staffing new Departments nationally but which also would be able to carry out relevant mission oriented researches in all aspects of computing.
f. Offering computer training programmes to reduce computer illiteracy rate in thecountry.
g. Fostering interdisciplinary research for a robust technologically-empowered economy.

2.3CAREER OPPORTUNITIES

Computer Science graduates are in high demand with a lot of career opportunities in the areas of:

a. Teaching and Research:

Computer Professors/Lecturers, Big data Analytics, Artificial Intelligence Researchers, Virtual Reality/Environment Designers, Cloud Technologists, IoT Designers, etc.

b. Opportunities in related fields within and outside the country:

Software Developers, Software Architects, Mobile Application developers, Computer Scientists, Programmer Analysts, Data Managers and Scientists, Web Developers, Security Professionals, etc.

c. Opportunities in industries, companies, government and non-governmental agencies, parastatals, etc.:

Database Administrators (DBA), Network Engineers, Network Analysts, Information Security Analysts, Cyber Security Analysts, System Administrators, Software Project Managers, Hardware and Software Engineers, etc

d. Opportunities for entrepreneurship:

Websitedevelopment and Management, Graphic Designers, Net – Technician, Computer Based Test (CBT) Center Managers, Forensic Experts, E-commerce Managers, Mobile App Designer, Computer Training Centers (software/hardware), etc.

3.0 The Degree Programme

The program is of a five-year duration leading to the award of B.Tech degree in computer Science.The special areas handled in the department includes Artificial Intelligence, Cloud Computing, Computer Graphics, Computer Hardware, Computer Networks, Database Management Systems, Cybersecurity, Internet of Things (IoT), Software Engineering, etc.

In the first two years, the programme is blended with Mathematics, Physics, Chemistry and Engineering based technological skills. In the subsequent years, a wide range of Core Computer Science courses are covered to meet the need of the various specializations. A nine month Students' Industrial Work Experience Scheme (SIWES) is an integral part of the program - (3 months in the second year and 6 months in the fourth year). In the fifth year every student undertakes a research project under the special areas mentioned above.

4.0 ADMISSION REQUIREMENTS

4.1Admission through UTME

i. SSCE/GCE 'O' Level with credit in 5 subjects including Mathematics, Physics, Chemistry, Biology/Agricultural Science and English Language at not more than two sittings.
ii. UTME subjects are **English Language, Mathematics, Physics and Chemistry.**

4.2 Admission by Direct Entry

(i) HSC/GCE/JUPEB 'A' Level passes in two relevant subjects (Mathematics/Further Mathematics, Physics/Computer Studies), including English Language.
(ii) Holders of ND (OND) certificates with minimum of Upper Credit pass are eligible for admission into Year II provided that their programmes cover adequately certain Foundation Year Courses offered in the University.
(iii) Holders of HND with minimum of Upper Creditpass are eligiblefor admission into Year III depending on the appropriateness of their requisite academic preparation.
(iv) In addition to fulfilling the conditions stipulated in (ii) and (iii) above, a holder of ND (OND) and/or HND must also have 5 SSGE/GCE 'O' Level credit passes.

4.3 Admission by Transfer

Occasionally, advanced placements are offered to students who transfer from other universities after a careful review of their transcripts by the Departmental Board of Studies.

5.0 Examination Results

Performance in a course shall be recorded in letter grades as follows: Each of the letters is the equivalent of the grade point as shown below.

% Score	Grade	Grade Point Equivalent	Remarks
70 – 100	A	5	Excellent
60 – 69	B	4	Very Good
50 – 59	C	3	Good
45 – 49	D	2	Pass

40 – 44	E	1	Pass
0 –39	F	0	Failure

For courses with laboratories, the weighting shall be:

Examination	60%
Test	20%
Practical	20 %

For courses without laboratories, the weighting shall be:

Examination	70%
Test	30%

5.1Result Computation

(a) The number of grade points for each course completed by a student is computed by multiplying the number of units for the course by the grade point equivalent he/she obtained in the course. The sum of the grade points for all the courses registered gives the total grade point (TGP).

(b) The sum of the units of all the courses registered by the student is called Total number of units (TNU)

(c) The Student's Grade Point Average (GPA) is calculated as

$$\text{GPA} = \frac{TGP}{TNU}$$

This is calculated for each semester. To calculate for a session, we obtain the Cumulative GradePoint Average (CGPA) as

$$\text{CGPA} = \frac{TGP}{TNU}$$

5.2Degree Classification

All degree courses (required, electives, and General Studies) undertaken by a student as well as the compulsory completion of Industrial Attachment shall count toward the evaluation of his or her degree. The class of degree shall be determined as follows:

CLASS OF DEGREE	**CGPA**
1st Class Honours	4.50 - 5.00
2nd Class Honours (Upper Division)	3.50 - 4.49
2nd class Honours (Lower Division)	2.40 - 3.49
Third Class Honours	1.50 - 2.39
Pass	1.00 - 1.49
Fail	0.00 - 0.99

5.3 Graduation Requirements

Subject to the recommendation for graduation by the Computer Science Department Board of Studies, for the award of Bachelor of Technology (B.Tech.) degree in Computer Science must satisfy the following:

(a) All admission requirements.

(b) Completion of the course requirements of the Department.

(c) Complete a minimum of 187 course units, including 148 credit units of directly listed Department course (see course outline below) and 8 credit units of Student industrial Work Experience Scheme (SIWES) courses taken by a student outside above requirements would be considered as free electives. Any such free electives will count towards the computation of the student's results but may not prevent the student from graduation if the student failed them.

5.4 Degree Offered

Students who successfully complete the above programme requirements and are found worthy in character and learning are awarded the Bachelor of Technology (**B. Tech.**) Degree in Computer Science.

6.0 Withdrawal from the University

6.1 Voluntary Withdrawal

i. Students who wish to withdraw from the University are required to notify the Registrar in writing as well as Dean of the School through the Head of Department. The period of withdrawal shall not exceed one academic year and is subject to approval by the Senate.

ii. For returning students, a written notice of withdrawal shall be given not later than four weeks after the beginning of the semester. For fresh students notice shall be given not later than two weeks after matriculation.

iii. Any student withdrawing from the University shall be required to give genuine reason for the withdrawal.

iv. Students who so withdraw from the University shall in order to be readmitted send a formal application to the registrar through the Dean and the Head of Department and receive official approval before he returns.

v. Senate may however prescribe conditions which shall be fulfilled before students may resume their programmes of studies.

6.2 Unauthorized Withdrawal

Students who withdraw from the University without authority may not be considered for re-admission until the Senate has dealt with their cases on individual merits.

6.3 Withdrawal for Academic Reasons

All students who are admitted into the University are expected to maintain acceptable standards of academic performance. Every student is also expected to maintain a minimum Grade Point Average for his/her year of study. Specially, students obtaining a CGPA of less than 1.00 shall be asked to withdraw from the university.

7.0 Heads of Department

Dr. O. F. Uzoh (B.Sc, Mathematics, M.Sc. and Ph.D Computer Science)
July 1, 2008 – June 30, 2013.

Prof. S. C. Inyama (B. Sc (Hons.), M.Sc. and Ph.D. Mathematics)
July 1, 2013 – June 30, 2015.

Prof. E. N. Erumaka (B,Sc, M.Sc. Ph.D Mathematics) July 1,
2015 – June 30, 2018.

Dr. E. C. Nwokorie (MNCS, MCPN, MIEEE, MACM, B,Sc (UNN), M.Sc.,
Ph.D (UPH)) July 1, 2018 – Date.

7.1 ACADEMIC CONTENT/CURRICULUM

7.1 COURSE CONTENT SPECIFICATIONS/SYLLABUS OF ALL COURSES IN THE PROGRAMME/SUB-DISCIPLINE/DISCIPLINE

COURSE CONTENTS

100 Level Courses

Year I Harmattan

Course Code	Course Title	L	T	P	Units
MTH 101	Elementary Mathematics I	3	1	0	4
PHY 101	General Physics I	2	1	1	4
CHM 101	General Chemistry I	2	1	1	4
BIO 101	Biology for Physical Sciences	2	0	1	3
ENG 101	Workshop Practice I	0	0	1	1
ENG 103	Engineering Drawing I	0	0	1	1
GST 101	Use of English I	1	1	0	2
GST 103	Humanities	1	0	0	1
IGB 101/FRN 101	Use of Igbo I/French I	1	0	0	1
	Total	**12**	**4**	**5**	**21**

*Students are to register either IGB 101 or FRN 101.

Year I Rain Semester

Course Code	Course Title	L	T	P	Units
MTH 102	Elementary Mathematics II	3	1	0	4
PHY 102	General Physics II	2	1	1	4
CHM 102	General Chemistry II	2	1	1	4
ENG 102	Workshop Practice II	0	0	1	1
ENG 104	Engineering Drawing II	0	0	1	1
GST 102	Use of English II	1	1	0	2
GST 110	Science, Technology and Society	0	0	1	1
GST 108	Social Science I	1	1	0	2
IGB 102/FRN 102	Use of Igbo II/French II	1	0	0	1
	Total	**10**	**5**	**5**	**20**

*Students are to register either IGB 102 or FRN 102.

200 Level Courses

200 Level Harmattan Semester Courses

Course Code	Course Title	L	T	P	Units
CSC 201	Computer and Applications I	2	1	1	4
CSC 203	Fundamentals of Cyber Security I	1	1	0	2
MTH 201	Mathematical Methods I	2	1	0	3
MTH 203	Elementary Differential Equations I	2	1	0	3
STA 211	Introduction to Statistics and Probability	2	1	0	3
PHY 201	Applied Electricity I	2	1	0	3
ENG 201	Workshop Practice III	0	0	1	1
GST 201	Social Science II	1	0	0	1
Total		**12**	**5**	**4**	**20**

200 Level Rain Semester Courses

Course Code	Course Title	L	T	P	Units
CSC 202	Computer and Applications II	2	0	1	3
CIT 204	Computer Architecture and Organization I	1	0	1	2
CIT 202	Computer Programming I	1	0	1	2
MTH 202	Mathematical Methods II	2	1	0	3
CSC 204	Fundamentals of Cyber Security II	1	1	0	2
CSC 208	Introduction to DB Design and Applications	1	1	0	2
MTH 222	Numerical Methods	2	1	0	3
STA 212	Probability and Random Variables	2	1	0	3
Total		**13**	**5**	**5**	**20**

Year Two: SIWES Programme

S/N	Course Code	Course Title	Units
1.	SIW 200	SIWES	2
TOTAL			**2**

300 Level Courses

300 Level Harmattan Semester Courses

Course Code	Course Title	L	T	P	Units
CIT 301	Operating Systems I	1	0	1	2
CIT 303	System Analysis and Design	2	1	0	3
CSC 303	Computer Systems Laboratory	1	0	1	2
CSC 305	Data Structures and Algorithms	2	0	0	2
CSC 307	Structured Programming	1	0	1	2
CSC 309	Discrete Structures	2	1	0	3
PHY 303	Applied Electronics	2	0	1	3
CIT 305	Introduction to Software Engineering	1	0	1	1
ENS 301	Introduction to Entrepreneurship & Innovation I	2	0	0	2
Total units of mandatory courses		**14**	**2**	**5**	**21**

HARMATTAN TOTAL = 21 - 24 UNITS

Elective Courses

Course Code	Course Title	L	T	P	Units
MTH 303	Real Analysis I	2	1	0	3
STA 311	Introduction to Statistical Inference	2	1	0	3
CSC 311	Statistical Computing	1	0	1	2

300 Level Rain Semester Courses

Course Code	Course Title	L	T	P	Units
CSC 310	Operating System II	1	0	1	2
CSC 302	Computer Architecture and Organization II	2	0	0	2
CIT 304	Database Management Systems Design I	2	0	1	3
CIT 302	Computer Programming II	2	0	1	3
CIT 306	Web Design and Programming I	2	0	1	3

CSC 304	Compiler Construction I	1	0	1	2
CSC 306	Assembly and Machine Language Programming	1	0	1	2
ENS 302	Introduction to Entrepreneurship & Innovation II	2	0	0	2
Total units of mandatory courses		**13**	**0**	**6**	**19**

RAIN TOTAL = 19 - 24 UNITS

Elective Courses

Course Code	Course Title	L	T	P	Units
CSC 308	Introduction to Theory of Computing	2	0	1	3
MTH 304	Real Analysis II	2	1	0	3
CSC 312	Object-oriented Programming	1	0	1	2

300 LEVEL TOTAL = 40 - 48 UNITS

400 Level Courses

400 Level Harmattan Semester Courses

Course Code	Course Title	L	T	P	Units
CSC 401	Survey of Programming Languages	1	0	1	2
CIT 401	Database Management Systems Design II	2	0	1	3
CSC 403	Computer Hardware Systems Design	1	0	1	2
CSC 405	Algorithms and Complexity Analysis	2	0	0	2
CSC 407	Computer and Society	2	0	0	2
CSC 409	Human Computer Interface Design	1	0	1	2
CSC 411	Computer Applications in Operations Research	2	0	1	3
CSC 415	Mobile Computing Systems Design	1	0	1	2
IFT 405	Research Methodology & Capstone Mgt	2	0	0	2
Credit units of compulsory courses		**14**	**0**	**6**	**20**

HARMATTAN TOTAL = 20 - 24 UNITS

Elective Courses

Course Code	Course Title	L	T	P	Units
CSC 417	Embedded Systems and Firmware Design	2	0	1	3
CSC 419	Compiler Construction II	1	0	1	2
CSC 421	Database Systems Programming	2	0	1	3
CSC 423	Concurrent Systems programming	2	0	1	3
CSC 413	Numerical Computations	1	0	1	2
STA 451	Design and Analysis of Experiments I	2	1	0	3

Course Code	Course Title	L	T	P	Units
SIW 400	Student Industrial Attachment	0	0	6	6

400 LEVEL TOTAL = 26 - 30 UNITS

500 Level Courses

500 Level Harmattan Semester Courses

Course Code	Course Title	L	T	P	Units
CSC 501	Software Engineering	2	0	1	3
CSC 503	Information Systems Management	2	1	0	3
CSC 505	Algorithmic Techniques for Smart Systems	2	0	0	2
CSC 507	Data Communication Systems	1	0	1	2
CSC 509	Net-Centric Computing and Data Security	1	0	1	2
CSC 511	Artificial Intelligence	2	0	1	3
CSC 513	Data Mining & Big Data Analysis	2	0	1	3
CSC 555	Final Year Project	0	0	3	3
Credit units of compulsory courses		**12**	**1**	**5**	**18**

HARMATTAN TOTAL = 18 - 24 UNITS

Elective Courses

Course Code	Course Title	L	T	P	Units
CSC 515	Microprocessor Architecture	2	0	1	3
CSC 517	Distributed Computing Systems Design	2	0	1	3
CSC 519	Special Topics in Information Technology	2	1	0	3
CSC 521	Organization of Programming Languages	2	0	0	2
STA 513	Sampling Theory and Survey Methods II	2	1	0	3

500 Level Rain Semester Courses Schedule

Course Code	Course Title	L	T	P	Units
CSC 502	Formal Models of Computation	2	0	1	3
CSC 504	Computer Graphics and Visualization	2	0	1	3
CSC 506	Computer Networks and Communications	2	0	1	3
CSC 508	System Performance Evaluation	2	0	1	3
CSC 510	Computer Modeling and Simulation	2	0	1	3
CSC 514	Special Topics in Software Engineering	2	0	1	3
CSC 512	The Internet of Things	1	0	1	2
CSC 556	Final Year Project	0	0	3	3
Credit units of compulsory courses		**13**	**0**	**7**	**20**

RAIN TOTAL = 20 - 24 UNITS

Elective Courses

Course Code	Course Title	L	T	P	Units
CSC 516	Cryptography Algorithms and Applications	2	0	1	3
STA 502	Decision Theory	2	1	0	3

500 LEVEL TOTAL = 38 - 48 UNITS

Note: Students from (200 to 500) levels can apply to take up to 27 units courses. Their CGPA should be 3.0 and above except those in 500 level.

100 LEVELCOURSES

BIO 101: General Biology I (2 0 1)

Cell structures and Organization; plant and animal cells. Functions of cellular organelles; diversity, characteristics of living things, General reproduction, mitosis and meiosis,

abnormalities associated with gene crossing, heredity and evolution. Concepts of ecology and types of habitats, diversity of plants and animals, food chains and food webs; interrelationship of organisms, elementary biochemistry of carbohydrates; proteins and lipids structure and chemical characteristics.

CHM 101: General Chemistry I (2 1 1)
Chemical reaction, equations and stoichiometry, Atomic structure and the periodic classification of elements. Electronic theory of atoms, Radioactivity, Ionic and covalent bonds, Solids and their structure. Dipole interactions and its effect on physical properties, Redox reaction, Equilibrium, Elementary electrochemistry, Introduction to Kinetic properties of gasses, Basic chemical Kinetics and Chemical thermodynamics, Principles of Metal Extraction.

CHM 102: General Chemistry II (2 1 1)
Organic formulae and structure. Homology and Isomerism. Concepts of hybridization. Survey of reactions of functional groups in Aliphatic and Aromatic compounds. Introduction to the chemistry of alkalines. Alkenes, Alkynes, Halokanes Alkanols, Esters, Amines, Aldehydes, Ketones, Carboxylic acids and their derivatives.

ENG 101: Workshop Practice I (0 0 1)
General: Use of engineering measuring instruments Calipers e.g. Vernier Calipers; Gauges e.g. Micrometer Screw gauge and other devices. Introduction to hand tools, proficiency in the use of wood planer, Hand Saw, Sanders and Pattern Making. Sheet Metal Work: Production of sheet metal product – layouts, cutting, shaping, simple bend theory, Introduction to joining techniques: soldering, brazing, fusion welding, fastening and assembly, Basic woodworking principles and tools finishing and evaluation of finished products.

ENG 102: Workshop Practice II (0 0 1)
Industrial safety; Behaviour analysis safety consciousness. Survey of sources of common accidents. Accidents prevention and control. Machine-shop work: Lethe-work: Instruction of metal working process. Shaping, milling, grinding, drilling and metal spinning etc. Design of simple jigs and fixtures. Automobile diagnosis and repairs. Electrical Workshop Practice: Convention and application of colours codes and sign etc. Use of the tools, machines and conductors.

ENG 103: Engineering Drawing I (0 0 1)
Introduction to the engineering tools. Planning and layout of engineering drawing. Engineering drawing concept. Introduction to Dimensioning – types; Dimensioning of circles, holes, radii, tolerancing. Descriptive Geometry. Freehand sketching. Introduction to Drawing/Drafting Software and CAD Basic tools: Orthographic multi view projection. Construction of plane shapes using CAD construction techniques. Presentation of data result using charts, graphs etc. by appropriate computer software. Further dimensioning – addition of dimensions to drawing using CAD.

ENG 104: Engineering Drawing II (0 0 1)
Connections in engineering drawing. Introduction to IS code of drawing. Conics and engineering curves ellipse, parabola, hyperbola, cycloid, trochoid, involutes. Projection on auxiliary planes and solids. (cube, prism, pyramid, cylinder, core and sphere), projection on auxiliary planes. Isometric projection. Introduction to section drawing and use of CAD construction techniques. Development and intersection of surfaces. Detail drawing with the addition of machine and surface texture symbol. Simple assembly drawing with suitable fits

and part list and introduction to limits and tolerances. Screw thread, fasteners and springs including keys and key ways.

FRN 101: French Language I (1 0 0)
This course will introduce the students to the basics of French Language such as greeting in French, French alphabets, vowels, pronunciation and accents. The students will also learn the components of French grammar as the article, verb, etc.

FRN 102: French Language II (1 0 0)
Here, the students will be drilled in French grammar proper, dialogue and other oral exercises. The students will also be introduced into reading, starting with France Afrique book 1. At the end of this course, the students should be able to speak basic French and be able to tell time in French.

GST 101: Use of English I (1 1 0)
Library orientation, study aids through dictionary practice, vocabulary development techniques, reading and comprehension techniques, listening and note-taking techniques – outlining and summarizing, dealing with examination questions.

GST 102: Use of English II (1 1 0)
Second stage library work with emphasis on effective search techniques, paragraph development, essay writing principles and practice, term paper writing, technical report writing, business letter writing, referencing and documentation, grammar and mechanics.

GST 103: Humanities (1 0 0)
Introduction to humanities, definition and rationale. Role literature in the humanities aspects of the contemporary African Novel; significant examples of African/Western poetry; dramatic art – role and relevance in modern Nigeria with practical. Demonstrations/performances. Roles of philosophy in the humanities, man and his quest for certainty; materialism, idealism, the meaning and significance of selected concepts-freedom, responsibility, obligation, the "good life", art beauty; values – relative and non-relative; inductive arguments and scientific reasoning. Exposure to African History – its role and relevance, African art and music – its history and development, Religion and the meaning of life-past, present and future.

GST 108: Polity and Economy of Nigeria (1 1 0)
This covers the nature and scope of politics and economics. From the basic concepts in public investment and economic infrastructures to fiscal federalism and revenue allocation. A global perspective of economics; economic systems and development, nations' economics, international trade and economic development; Balance of payments, commercial policies of Nigeria and other developing countries. Economic integration; state and structure of economics of ECOWAS countries, the ECA and countries, the ECA and economic co-operation in Africa. Foreign aid and investments: the multinational corporations, technological dependence. Global interdependence and the New International Economic Order. World economic crises, energy and OPEC, food storages and armament.

GST 110: Science, Technology and Society (1 0 0)
The scientific evolution of man-science, need, history, classifications, and modern scientific methods; science and man's environment – Terrestrial and Cosmic Life; harnessing science – climate and vegetation. Production, processing, conservation, distribution; energy resources – solar, thermal, nuclear energy – fossil fuels, estimates of energy reserves in Nigeria.

IGB 101: Introduction to Igbo Grammar, Composition and Comprehension (1 0 0)
This course will equip the students with the basic skills, listening, speaking, reading and writing in the approved 1961 orthography as the basics for standard Igbo.
Nkowabanyerendi Igbo, Mkpuruedemede Igbo (Otografionwu), Nkejiasusu Igbo, Akaraedemede, Nkebiokwu Igbo, Nkebiahiri Igbo, Ahiriokwu Igbo, Udi ahiriokwu di icheiche, Asusu Igbo dikaAsusu SVO, Nkejiokwu Igbo, Ndakoritaudaume, Udaolu, Ntughari, Edemede (kompozishon), Edemleta, Atumatuokwu, Aghotaazaa (Aguozaa), Nchikota, Ekwumekwun'asusu Igbo, Ikwuokwun'oha, Nsupe n' Igbo.

IGB 102: Introduction to Igbo History, Culture and Literature (1 0 0)
This course will expose students to various aspects of human life among the Igbos as follows: Igbo world-view, Igbo culture and history, Igbo in a world of arts and civilization. It will also provide a good exposure in the area of Igbo literature which embodies the totality of the Igbo World-view, including their social and cultural perspectives, their aspirations and amenities, as some contemporary texts will be incorporated in the study.
Akukobanyerendi Igbo nammalitendu ha, Ekelenansopurun'ala Igbo, Ndi Igbo nannabatandiObia, Ewumewundi Igbo, Ewumewunkwaliteakunauba, Ewumewuokpukprechi, Ewumewuahiuke, Ewumewuokwuochichi, Mmekoritandi Igbo nandiagbataobi ha, Akukookike, Aru, Onwu nan du, Akwamozu, Okwukwe di icheichendi Igbo nwere, Agumagu Igbo, Ngalabaagumagu Igbo naejirimara ha, Akparamagwanauruagumaguonunaagumaguederede, nkowangalabaagumagu di iche, Njemnleghariany a.

MTH 101: Elementary Mathematics I (3 1 0)
Number systems, Indices, Surds and Logarithms, Polynomials, Remainder and factor theorem, Polynomial equations, Partial fractions, Fields, Ordered fields. Inequalities. Mathematical induction. Permutations and combinations. Binominal theorem. Sequences and series. The quadratic equation and function. Relation between the roots and the coefficients. Complex numbers. Addition, subtraction, multiplication and division. Argand diagram. De-Moivre theorem, n-th roots of complex numbers. Elementary set theory. Venn diagrams and application of De-Morgan's laws. Trigonometry. Elementary properties of basic trigonometric functions. Addition formulae and basic identities. Sine and cosine formulae. Half angle formulae. Area of a triangle. Solution of trigonometric equations. Inverse trigonometric functions. Function, Concept and notation. Examples composition, Exponential and logarithmic functions. Graphs and properties. Limits and continuity. Techniques for finding limits. The derivative. Calculations from first principles, Techniques of differentiation. Chain rule. Higher order derivatives. Extreme problems. Mean Value Theorem. Applications. Indeterminate forms and L'Hopital's rule. Taylor's and Maclaurin's series. Curve sketching. Integration as the inverse of differentiation, as area, as limit of finite sum. Applications.

MTH 102: Elementary Mathematics II (3 1 0)
Transcendental functions. Inverse functions. Logarithmic improper integrals, First-order equations with variable separable. First order linear equations. Second order homogenous equations with constant coefficients. Applications. Plane analytic geometry. Rectangular Cartesian co-ordinates. Distance between two points. Straight line. Loci. The circle, parabola, ellipse and hyperbola. Second degree curves. Plane polar coordinates. Vectors: Vector addition and multiplications. Products of three or more vectors. Vector functions and their derivatives. Velocity and Acceleration. Matrix algebra. Addition and multiplications. Transpose. Determinants. Inverse of non-singular matrices. Cramer's rule and application to the solution of linear equations. (Examples should be limited to m x n matrices where m=3,

n=3). Transformations of the plane. Translation, reflection, rotation, enlargement, shear, composition of transformations. Invariant points and lines.

PHY 101: General Physics I (2 1 1)
Mechanics: Space and Time, Units and dimensions; Vectors kinematics, Newton's laws; Galilean invariance; Statics and dynamics of particles; Universal Gravitation; Work and potential energy, conservation of energy and momentum; Rigid bodies, Elasticity; Hooke's law, Young's, Shear and bulk moduli. Fluid mechanics; Hydrostatics, pressure, buoyance, Archimedes' principles, surface tension, adhesion, cohesion, capillarity, drops and bubbles. Thermal Physics: thermal properties, including elementary thermodynamics and kinetic theory. The laboratory course emphasized qualitative measurements, the treatment of error measurements and graphical analysis. A variety of experimental techniques will be employed.

PHY 102: General Physics II (2 1 1)
Electricity: Electrostatics, Charge and matter, the electric field, Gauss's law, electric potential, capacitors and dielectrics. Current electricity, Current and resistance, Ohm's Law, electromotive force and circuits, RC circuits. Magnetism: Magnestotics, the magnetic field, Ampere's Law, Faraday's Law of induction, inductance, LR circuits. Magnetic properties of matter. Sound and Optical Properties. The laboratory course emphasized qualitative measurements, the treatment of error measurements and graphical analysis. A variety of experimental techniques will be employed.

200 LEVEL COURSES
PHY 201: APPLIED ELECTRICITY 1 (2 10)
Electrical circuit theory: Dc and Ac circuit analysis. Magnetic circuit: magnetomotive force, magnetic flux and reluctance, relative magnetic permeability and susceptibility. Introduction to electrical machines: Dc generator; Dc motor; polyphase systems; transformers, electric power distribution. Electric lamps and illumination. Galvanometers, ammeter and voltmeters.
GST 101: USE OF ENGLISH (1, 1, 0)

ENG 201: WORKSHOP PRACTICE III (0 01)
Introduction to Manufacturing Technology. Basic Foundry Technology: Sand testing, mixing of sands, preparation of moulds. Pattern making- solid, split, sweep patterns; hosting gates and risers. Melting and pouring of metals, solidification, casting of simple shapes using sand moulds, permanent moulds and expendable polystyrene. Casting defects. Joining: Design of welded joints, stress analysis, types of joints e.g. T. joints, BUTT joint, Corner joints (Cap joints etc), soldering, and brazing, adhesive joints. Fusion welds-e.g. manual metal arc, TIG, SAW, SPOT, Etc. Edge preparation, surface cladding, etc. Strength and toughness of welded joints, Laser welding, radio frequency (RF) welding. Pre-requisites: ENG 101 and ENG 102.

GST 201: NIGERIAN AND AFRICAN CULTURAL DEVELOPMENT SOCIAL SCIENCE II(1 0 0)
Concept and meaning of development; traditional Africa's geographical and ethnographical review, family structure, kinship system, socio-economic pre-occupations, political systems, art and music, modes of communication etc. African and processes of modernization-education, writing and press, urbanization and social change, modern trends in art and aesthetics, nationalism and cultural revival, mass media and national development.

MTH 201: MATHEMATICAL METHODS I (2 1 0)
Functions of two or more variables. Limits and continuity, partial derivatives, directional derivatives, tangent plane and normal line. Gradient, chain rule. Total differential, implicit functions, Jacobians, inverse functions, Maxima and minima, Lagrange multipliers. Higher order derivatives, the Laplacian, second derivative test for maxima and minima. Exact differentials. Derivatives of integrals, Taylor's theorem, multiple integrals. Calculation of areas, volumes, centers of mass. Moments of inertia and etc. infinite sequences and series. Absolute and conditional convergence. Power series. Pre requisite: MTH 101 & MTH 102.

MTH 202: MATHEMATICAL METHODS II (2 1 0)
Vectors. Products of vectors. Equations of lines and planes. Vector spaces. Linear dependence and independence. Basis and dimension. Linear transformations, matrices. Inverse of matrix. Determinants. Operations on matrices. Rank of a matrix .crammer's rule. Eigenvalues and eigenvectors. Similarities to diagonal matrices. Pre-requisites: MTH 101 & MTH 102.

MTH 203: ELEMENTARY DIFFERENTIAL EQUATION I (21 0)
Derivation of equation from physics, chemistry, biology, geometry and etc. first order equations. Applications of first order equations. Second order linear equations. Fundamental solutions. Linear dependence and independence. Wronskian. Properties of solutions of linear equations. Method of undetermined coefficients and variation of parameters. Applications of second order linear equations. General theory of n-th order linear equations. Laplace transforms. Convolution. Solution of initial-value problems by Laplace transforms method. Difference equations. *Pre-requisites: MTH 101 & MTH 102*.

MTH 204: ELEMENTARY DIFFERENTIAL EQUATION II (210)
Series solutions about ordinary and regular singular points, Bessel, Legendre and hypergeometric equations and functions. Gamma and Beta functions, Sturm-Liouville problems. Orthogonal functions. Fourier, Fourier-Bessel and Fourier-Legendre series, Fourier transformation. Solution of Laplace, Wave and Heat equations by Fourier method. *Pre-requisites: MTH 101 & MTH 102.*

STA 211: INTRODUCTION TO STATISTICS AND PROBABILITY (2 1 0)
Frequency distributions, measure of location and dispersion in simple and grouped data. Laws of probability. The binomial, Poisson and normal distributions. Estimation and tests of hypothesis. Analysis of variance and covariance, simple regression and correlation, contingency tables and$\square^2$.descriptive methods- stem and leaf charts. Graphical Displays- Box and Whisker plots. Application. *Pre-requisites: MTH 101 & MTH 102*.

STA 212: PROBABILITY AND RANDOM VARIABLES (2 1 0)
Probability spaces, random variables, distribution function, expected value. Examples of discrete and continuous distributions. Mean, variance, moments and generating functions. Conditional probability, Bayes theorem, joint distributions of transformed random variables. Chebychev's inequality, law of large numbers and central limit theorem, multivariate normal distribution, co-variance and correlation. *Pre-requisites: MTH 101 & MTH 102*.

MTH 222: NUMERICAL METHODS (210)
Solution of algebraic and transcendental equations. Curve fitting, Lagrange and Aithens interpolating polynomials. Errors. Difference calculus. Newton forward and backward difference formulae. Approximation of functions. Numerical differentiation and integration. Numerical solution of systems of linear equations. Numerical methods for differential

equations. *Pre-requisites: MTH 101 & MTH 102*.

CSC 201: COMPUTER AND APPLICATIONS I (211)
The discipline of computer science. Evolution of computer systems, Classification of computers. Computer hardware: Functional components, Modern input/output units. Computer software: operating system, Application packages: Word processing, Spreadsheet, Statistical packages. Data Processing Systems, Data representation in digital computers. Number systems. Binary number representation. Unsigned addition and subtraction. One's and two's complement. Signed magnitude and excess radix number representations. Introduction to computer network and the Internet. Programming language translators; Program Development: Flowcharts and Algorithms; Computer programming in recent versions of BASIC/Visual BASIC.

CSC 202: COMPUTER AND APPLICATIONS II (2 01)
Application packages: Word processing, Spreadsheet, Presentation package, Statistical packages. Internet Applications, and Database Management System. Software Tools involved: SPSS, MATLAB, OCTAVE, Oracle, Simulink, AutoCAD, ArchCAD, Latex, etc. Computer problem-solving methods: Role of algorithms in problem-solving; Concepts and properties of algorithms; Implementation strategies; Development of flowcharts and pseudocodes; Program objects; Implementation of algorithms in a programming language such as Visual Basic, Java, C/C++.

CIT 202: COMPUTER PROGRAMMING I (101)
Problem Solving Process: Problem Identification, Formal Representation of the Problem, Identification of Inputs and Outputs to the Problem. Concept and Properties of Algorithms. Algorithm Development using Pseudocodes and Flow Charts. Algorithm Implementation: Choice of Programming Language (Python, Visual Basic, Java, C/C++), Program Design and Coding Styles (Procedural, Modular and Object Oriented Programming). Data Types, Keywords, Operators, Standard Library functions, Data Structures, Control Structures (Sequence, Selection and Repetition), String Processing, File Processing, Parameter Passing Techniques (Passing by Value and Passing by Reference), Concept of Binding (Static and Dynamic Binding), Storage Allocation Techniques. Program Debugging, Program Testing and Documentation. Programming laboratory exercises.

CIT 204: COMPUTER ARCHITECTURE AND ORGANIZATION I(10 1)
Review of computer systems basic structure and types. Differences between computer architecture and computer organization. Review of Computer operation, fetch and execute cycle, interrupts, stack operations. Architecture types: Von Neumann, Multicore, Multiprocessor systems. Instruction Set Architecture types: CISC, RISC, VLIW, EPIC architectures. Review of computer hardware system components; CPU, Memory, I/O Systems. Microprocessors, internal architecture and system components; types of microprocessors. Memory types: semiconductor, optical and magnetic memories, standards, memory hierarchy. I/O Systems design and types. Study of microcomputer system organization and operation, bus architecture and standards. Hardware control and micro programmed control. Direct Memory Access (DMA) and interrupt systems. Computer arithmetic and logic. Boolean Algebra and Logic Gates. Combinational and Sequential circuits design and applications. Decoders, multiplexers, adders, Registers, Counters, etc. Assembly language programming, addressing modes. Design assignments.

CSC 204: FUNDAMENTALS OF CYBER SECURITY II (1 10)

Operating system protection mechanisms, intrusion detection systems, formal models of security, cryptography, Stenography, network and distributed system security, denial of service (and other) attack strategies, worms, viruses, transfer of funds/value across networks, electronic voting, secure applications, homeland cyber security policy, and government regulation of information technology.

CSC 208: INTRODUCTION TO DATABASE DESIGN AND APPLICATIONS (110)

Databases and database users, File Systems and DBMS, database applications, Database concepts; models, schemas, instances. Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems, relational database models, Basic SQL, ER,UML models, role of information Systems in Organizations, Database Design and Implementation Process using Microsoft Access.

CSC 203: FUNDAMENTALS OF CYBER SECURITY I(110)

Provides the overview of the introductory topics of cyber security. Topics including basic concepts of Confidentiality, Integrity, Availability, Authentication, Access Control, Non-Repudiation of Fault-tolerant methodologies for implementing security, security policies, best current practices, testing security, and incident response, risk management, disaster recovery, access control. Basic cryptography and software application vulnerability.

300 LEVEL COURSES

ENS 301: INTRODUCTION TO ENTREPRENEURSHIP AND INNOVATION (2 0 0)

Development entrepreneurship/entrepreneurships, The Nigerian entrepreneurial environment, creativity and intellectual rights, technological entrepreneurship, Innovation: theories and management, family business and succession planning, women entrepreneurship, social entrepreneurship, business opportunity set and evaluation, introduction to business strategy, introduction to business ethics and corporate governance, relationship between scientific research innovation and products, product invention, timeliness and processes.

ENS 302: BUSINESS CREATION, GROWTH AND CORPORATE GOVERNANCE (200)

Concept of business and new value creation, Introduction to theories of growth, Business strategy, Sources of capital, Principles of marketing, Business ethics and social responsibility, Opportunity sets and expansion considerations (E-commerce, E-Business, E-Trade), The Scientific/Engineer as an entrepreneur; opportunities and challenges, Managing transition (start up, growth), Basic accounting literacy, Feasibility and viability studies including issues in cash flow analysis, Crafting business plans, Corporate governance and change management.

PHY 303: APPLIED ELECTRICITY II (2 1 0)

Semiconductor devices: Semiconductors, diodes, transistors, integrated circuits. Diodes: characteristics curve; forward and reverse bias; rectification and filtering: zener diode; diode voltage regulators. Transistors: Bi-polar and field Effect transistors; characteristics curves, active and cut-off regions. Transistor Amplifiers, bi-polar and FET Amplifiers, biasing and load lines. Operational Amplifiers: Negative feedback; analog computation. Positive feedback; Oscillators, waveform generators.
Pre-requisites: PHY201.

MTH 303: REAL ANALYSIS I (2 1 0)

Sets. Functions. Mathematical induction. Properties of real numbers. Cauchy convergence criterion. Test for convergence. Limits and continuity of functions. Uniform continuity of functions. Uniform continuity and approximations. The derivatives. Mean value theorem. L'Hopitals rule. Taylor's theorem. Convex functions. Applications. *Pre requisite MTH 201*.

MTH 304: REAL ANALYSIS II (210)

The Riemann integral. Fundamental theorem of calculus. Improper integrals, Riemann-Stielties integral. Sequences and series of functions. Point wise and uniform convergence. Functions of several variables. Limits and continuity. The derivative in RP. Chain rule. Higher order derivatives. Extremum problems. Integration of functions of several variables. *Pre requisite MTH 201*.

STA 311: INTRODUCTION TO STATISTICAL INFERENCE (2 10)

Point estimation by moments and maximum likelihood methods. Properties of point estimators: unbiasedness, sufficiency, completeness. Uniformly minimum variance unbiasedness. Rao-Crammer inequality, consistency, efficiency, test asymptotic normality. Confidence intervals and regions. General method of finding a confidence bound, large sample confidence intervals. Bayesian method of estimation. Hypothesis testing. Neymann-pearson theorem. Comparison of populations by parametric methods. *Pre requisite STA 212*.

CSC302: COMPUTER ARCHITECTURE AND ORGANIZATION II (200)

Review of CPU organization and micro-architectural level designs; Instruction set designs, register transfer, CISC and RISC design principles. Instruction set architecture: instruction types, registers, and memory addressing modes.Bus organization and data-path design. Hardwired and micro-programmed control.Control unit design: Internal control signals. ALU operation. ALU design: Integer/floating point data representations: Addition, multiplication and division algorithms and implementation. Floating point processors; BCD arithmetic.Memory systems and their characteristics; Technology of magnetic recording, optical, and semi-conductor memories. Peripheral device designs. Architecture types: Von Neumann architecture, Very Long Instruction Word (VLIW) andExplicitly Parallel Instruction Computing (EPIC) architectures; Multiprocessor systems; Instruction pipelining; Super-scaler and super-pipeline architectures. Survey of real computers and microprocessors. Performance Evaluation: metrics and calculation, performance equations, Amdahl's law. Case studies of typical recent architectural designs. *Pre-requisite: CSC 201 or CSC 202*

CIT 302: COMPUTER PROGRAMMING II (201)

Review of Data Types and Structure; Numeric and String Types, Arrays, Pointers, etc. Program environments and operating systems facilities available to the programmer; Implementation of algorithms for arrays handling, enumerated data types, strings, searching, sorting, linked lists, recursion; Input/output file access and updating; Principles of Good Programming; Concepts of structured, modular and defensive programming; Object Orientation re-visited, Java IDE (Creating, Saving and Opening of Program Files); Class and Methods re-visited; Core concepts in Java Programming: Inputs/Outputs, Variables/Constants, Iteration, Decision, Operations, Data Manipulations; Advanced Concepts: Inheritance, Polymorphism, Encapsulation, exception Handling; Java I/O, File Manipulation. Use of modern programming tools in implementing business problems. Programming laboratory exercises and projects. Other Programming languages; C++, HTML and XML, and commonly used software packages, Oracle suites, ASP. Net, IIS and Apache**.** *Pre-requisite: CIT 202.*

CSC303: COMPUTER SYSTEMS LABORATORY (101)

Basic Computer Hardware: Input/Output Devices, Internal components of the system Units (Motherboard, Memory Banks, Expansion Slots,etc), Hardware components interconnections; Computer Maintenance, cloning and assembly. Computer Interfaces and Cables, Computer Networks and Data communications devices; Computer system security, Data protection techniques, Practical laboratory experiences with commonly used application software such as word processors, spreadsheets, database management systems, statistical packages, project management, Decision support systems, Computer graphics, Web design tools, Internet facilities. *Pre-requisites: CSC 201 or CSC 202.*

CIT304: DATABASE MANAGEMENT SYSTEMS DESIGN I(201)
Organization of information for storage and retrieval; Concepts of fields, records, files, and databases. Data storage devices and their characteristics, File organization and access methods: serial, sequential, indexed, multi-indexed/inverted, indexed-sequential; Relative file organization and hashing algorithm; Factors influencing file organization: Record blocking factors for tape and disk files; Classification of files: master, transaction, history/trends, Multimedia files; Data verification and validation methods; Records/files creation and manipulation constructs available in modern programming languages and DBMS: Information and File security, Concurrency and data integrity, Data file processing modes: batch, online, real-time, Report generation. Case studies, designs and algorithms.
Pre-requisite: CSC 201 or CSC 202.

CIT 305:INTRODUCTION TO SOFTWARE ENGINEERING (1 0 1)
Introduction to software techniques, methodologies and process models, specification modelling, requirements analysis and definition, agile software development, software design, quality assurance, testing, development tools and environments and software engineering, ethics, introduction to software management, dependability and security assurance.

CSC305: DATA STRUCTURES AND ALGORITHMS (2 00)
Abstract data types, Record structure, File Structure, Arrays/Lists, Linked Lists, Stacks, Queues, Trees, Graphs, and: Algorithms for their implementation and operations; Algorithms for finding paths and spanning trees. Design and analysis of efficient algorithms for searching, internal/external sorting, and merging; Algorithms for dynamic storage allocation, garbage collection and compaction; Integration of data structures, and searching sorting/merging methods and memory media into a simple database management system.
Pre-requisite: CSC 201 or CSC 202.

CSC312: OBJECT-ORIENTED PROGRAMMING(1 01)
Introduction to object-oriented programming, Basic object-oriented concepts: Data abstraction, Encapsulation, Classes, Objects, Messages, Methods, Inheritance, Polymorphism, Aggregation; OO analysis and design using UML patterns and frameworks, components and component object models; Operators and overloading; Structured OO program; Introduction to C++, Java and their library of functions; Programming assignments and projects using C++ and Java.

CIT301: OPERATING SYSTEMS I (10 1)
Review of historical development of Operating systems, operating system concepts and structure. Basic components of a modern operating system; Operating system kernel, Processor management: Concurrency control, Process and inter-process communication, Process synchronization, Deadlocks, Memory management, Device management, Files systems, protection and security. Case studies of the features of popular operating systems such as MS Windows, Unix, Linux, etc. Design features of: single-user, multi-user, network,

distributed, real-time, and embedded operating systems. Students will learn the following: installation and maintenance of Windows and Unix – like operating systems such as Linux; how to write programs that accomplishes part of their operation through interaction with the operating system; effective use of the operating system tools for writing shell scripts and batch files, pattern matching, editing, micro processing, data analysis and text processing.*Pre-requisite: CSC201 or CSC 202*

CIT303: SYSTEM ANALYSIS AND DESIGN(210)
System concepts; System components, Introduction to SSAD. System development life cycle: Project planning, Requirements specifications, Analysis, Preliminary investigation,: Fact gathering & techniques. Data delivery, Data flow diagrams. Process description; System design: Automated design tools, Data modeling, Structure charts, I/O and Report forms designs, security; Data Dictionary, Software design & coding System implementation: Software development; Hardware acquisition,, System integration and testing; Cost and time estimation and management of system development, System maintenance; Case studies and projects.

CSC307: STRUCTURED PROGRAMMING (1 0 1)
Structured Programming elements; Programming Abstractions; Structured design principles; Modular Programming; Choice of Data Structures; Structured program design techniques and tools; Structured Object-oriented Programming, Stepwise refinement; Advanced features of Structured Programming Language such as C/C++, Java, etc.

CSC310: OPERATING SYSTEMS II(1 01)
OS design approaches: Layered, Kernel and Virtual machine; File systems and management; I/O management: Goals of I/O software Device controllers, Direct Memory Access; Disk hardware, Disk Arm Scheduling algorithms; Memory-mapped Terminals, Advanced memory management schemes and algorithms: Caching; Virtual memory; Processor management and process scheduling; Concurrency control; Deadlock detection and prevention algorithms; Interrupt handlers; Error handling, Case study, Unix, Linux, Windows, Real-time operating systems.

CSC309: DISCRETE STRUCTURES (21 0)
Basic Set Theory; Basic definitions; Relations; Equivalence; Relation Partition; Ordered Sets; Boolean Algebra and Lattices; Logic; Graph Theory; Directed and Undirected graphs; Graph Isomorphism; Basic Graph Theorems; Matrices: Integer and Real Matrices; Boolean Matrices; Matrix Norms; Path Matrices; Adjacency Vectors/Matrices; Path Adjacency; Numerical and Boolean Adjacency Matrices; Applications to counting; Discrete Probability Generating Functions.*Pre-requisite: MTH201 or MTH202*

CSC304: COMPILER CONSTRUCTION I(1 0 1)
Review of Compilers, Assemblers and Interpreters; Basic structure of a compiler; Phases of compilation: Lexical analysis; Syntax analysis, semantic analysis code generation, Code optimization; Grammars and languages; Ambiguity in grammar; Parsing techniques; Symbol tables; Storage administration; Error handling; Intermediate codes; Optimization and code generation; Deterministic and non-deterministic finite automata; Compiler-compilers and translator writing systems. LEX and YACC.

CSC 311: STATISTICAL COMPUTING(1 0 1)
Explain statistical packages. Problems associated with analysis of stochastic problems and statistical data analysis by Applied Linear models; computational aspects of multiple regression model, programming for statistical problems and statistical packages. Design and analysis of sampling surveys: statistical data compression, 2D, 3D frequency tables. Point

and interval estimation; Test of significance; Test of Hypothesis; Analysis of categorical data; Model validation; X^2 test, probability, Multiple regressions, analysis of variance, Statistical control, use of statistical packages.

CSC 306: ASSEMBLY AND MACHINE LANGUAGE PROGRAMMING (2 0 1)
Assembler concepts: Assembler structure; Data-word definition, Instructions mnemonics and syntax, Assembler directives and commands, Assembly programs execution; Internal registers, Error flags and messages. Literals, Instruction set and instruction formats. Operand addressing mode; symbolic addresses; register transfer languages, machine cycles; MIPS architecture/Intel processor assembly programming; Numeric conversions, String processing; Macros, I/O services; Program control. Fetch-Execute cycle I/O operations, Interfacing assembly language programs to high-level language programs; Machine instructions and microprogramming; Case studies of simple machine language programming: ROMBIOS, NetBIOS, I/O control programs, etc.

CIT306: WEB DESIGN AND PROGRAMMING I(2 0 1)
Introduction to the www. Internet hardware infrastructures; Internet Software Systems; Review of the ISO Interconnectivity Model; Internet information communication infrastructures; Internet software systems; Internet-based system architectures; Protocols design; Organization WWW databases; HTML-document Structure images, links, maps, tables frames, forms, protocols and server technology- HTTP, TCP/IP, MIME, URLs CGI JavaScript-syntax, DOM, forms processing, common tasks style sheets- fundamentals, CSS formatting, CSS positioning, web design and usability, Introduction to XML-syntax, DTDs XSL, XHTML, Multimedia audio, video animation, Multimedia server and protocol technology, Web design and development tools-Editors; Dreamweaver, Macromedia Flash, HTML, Java Script, PHP, CGI, etc; Business-to-business websites; Website management tools; Web data security issues: threat detection and data protection techniques. Mini-projects on website analysis, design, implementation, and testing issues using client-server architecture

CSC308: INTRODUCTION TO THEORY OF COMPUTING(2 1 0)
Basics of formal languages with applications to syntax of programming languages; Models of computers including finite automata, transducers, and Turing machines; Unsolvable problems and their relevance to the semantics of programming languages; Concept of computational complexity including NP-Completeness;

400 LEVEL COURSES

CSC401: SURVEY OF PROGRAMMING LANGUAGES(1 0 1)
Overview of programming languages: History of programming languages; Brief survey of programming paradigms (procedural, object-oriented, functional, declarative, scripting languages), The effects of scale on programming methodology, Language description: Syntactic structure (Expression notation, Abstract syntax tree, Lexical syntax, Grammar), Language Semantics (Formal, Informal, Denotational, Axiomatic, Operational semantics). Types declarations: Overview of type-checking, Garbage collection; Abstraction mechanisms; procedures, function and iterations as abstraction mechanisms, parameterized types, modules in programming languages; Object Oriented Language paradigm, Functional and logic language paradigms. *Pre-requisite: CSC 201 or CSC 202.*

CIT 401: DATABASE MANAGEMENT SYSTEMS DESIGN II(2 0 1)
Goals of DBMS; Database system models: Relational, Hierarchical, network, Temporal, Object-oriented, Deductive models; Data modeling: Data dependencies, Normal forms, Data decomposition, Schema refinements; Relational calculus; Relational algebra; Query

languages; File organization and indexing: Tree structured indexing, hash-based indexing; Concurrency control; Data integrity and security: Data protection; Database system failures and recovery; Data warehousing and mining; Advanced database management systems; Database systems design automation; Advanced Query Languages; Intelligent Query Processing; Very Large Databases; Data Mining and Information Retrieval; High Dimensional Database Accesses: KDB-tree, R* tree, AB-tree, Feature Vectors and Image Databases; Multimedia indexing; Web Databases and Search Engines; Security Issues; Case studies and projects.

CSC 403: COMPUTER HARDWARE SYSTEMS DESIGN(101)

Computer circuits: diode arrays, programmable logicarrays, etc. Computer major integrated circuits; Fabrication process of SSI, MSI, LSI VLSI and WSI circuits. ALU circuits design; Control unit circuit design; Design and characterization of magnetic disks and tapes; optical disks; Design of semi-conductor memories; Flash memories; Design features of peripheral devices: CRTs, keyboards, mouse, light pens, printers, scanners; Character recognition devices; I/O interface/control circuits design; Analog-to-Digital and Digital-to-Analog converters; Operational amplifiers, Hardware diagnostic tools. *Pre-requisite: CSC301 or CSC302.*

CSC405: ALGORITHMS AND COMPLEXITY ANALYSIS(2 0 0)

Basic algorithmic analysis: Asymptotic analysis of upper and average complexity bounds; Standard Complexity Classes; Time and Space tradeoffs in algorithm analysis; Recursive Algorithms; Algorithms for unordered and ordered sets, graphs, matrices (with the semi-ring paradigm), bit vectors. Algorithms for integer arithmetic, real arithmetic, polynomial arithmetic, random numbers, matrix operations. Algorithms for text processors, language processors, operating systems, database management. Algorithms for natural language processing (concordances, context-free parsers), robotics (vision, manipulator operation), theorem proving and problem solving (decision methods, search heuristics). Divide and conquer. Solution of recurrence equations. Dynamic programming. *Pre-requisite: CSC 305*.

CSC407: COMPUTER AND SOCIETY(20 0)

Computing as a profession; Types of organizations affected by computers, Sociological impact of computers; Individuals and computers; Computers as auditing tools; Computers in Banking, Education, Government, Insurance, Medical profession, Consultancy services, Telecommunications, etc; Computers and the law of information technology; Computer Attacks and Cyber Terrorism; Contemporary health issues in Computing Profession and Environment: Health Hazards, Ergonomics, Protection and Remedies; A term paper is required on any of the topics; Experts are expected to be invited to speak on the above topics.

CSC409: HUMAN COMPUTER INTERFACE DESIGN(101)

Foundations of HCI: Understanding and Conceptualizing Interaction, Understanding Users, Designing for Collaboration and Communication, Affective Aspect, Interfaces and Interactions, Data Gathering, Data Analysis, Interpretation and Presentation; Principles of GUI: Process of Interaction Design, Identifying Needs and Establishing Requirements, Design, Prototype and Construction; GUI toolkits; Human-centred software evaluation and development; Software Tools for Modeling GUI; Data Structures for Coding Complex GUI Systems; GUI design, evaluation and programming Projects.

CSC411: COMPUTER APPLICATIONS IN OPERATIONS RESEARCH (20 1)

Nature and scope of operations research; Linear Programming and graphical methods; Sensitivity analysis; Duality Theory; Transportation and Assignment Problems; Network Analysis: CPM and PERT; Stochastic processes and Markov chains; Inventory Control Theory and Applications; Sequencing and Scheduling Problems; Decision Theory; Decision under Uncertainty; Decision-tree Models; Investment Appraisal; Resource Allocation; Equipment Replacement Analysis; Reliability of Series/Parallel systems; Time Series Analysis and Forecasting; Game Theory and Applications; Dynamic Programming Problems; Use of Operations Research Application Packages; Case studies and Simulation;

IFT 405: RESEARCH METHODOLOGY & CAPSTONE MANAGEMENT (200)

The following topics should be covered: Definition of research, scope of research characteristics of research, how to select research topics, planning for research, methods of data collection, instruments used in collection, instruments used in collecting information; sampling procedures, research design and the nature of the research. Methods of analyzing data and hypothesis testing; illustrative examples. Guidelines for writing the research report, report proposal and format for the completed project. Capstone Management: Integration of previously learned knowledge and skills in development, design, and presentation of a project in their professional area (say, IT): project plan and justification, develop marketing strategy, design work to satisfy performance, schedule and budget requirement; adjust for unplanned occurrence, and provision of status report. Emphasis should be laid on various chapters of our project report format.

CSC413: NUMERICAL COMPUTATIONS(1 01)

Matrix types and computations; Solution of linear and nonlinear systems of equations; Eigenvalue/eigenvector problems; Vector algebra; Numerical solution of ordinary and partial differential equations; Numerical interpolations; Function approximations: Spline functions Chebyshev functions; Stability and convergence analysis; Truncation error analysis; Numerical approximations: Fourier transforms, wavelet transforms; Multi-dimensional numerical interpolation; Matrix/vector computations: Eigenfunctions, singular value decomposition; Numerical solution of some linear/nonlinear ODEs and PDEs; Numerical optimization methods; Advanced analytical methods and algorithms applied to solving problems in signal quantization, image processing, optical processing, surface modelling, linear/nonlinear control Introduction to mathematical software such as Matlab, Mathematica, MathCAD, Maple; Projects on numerical computations with applications to image processing, data analysis and scientific modeling.

STA 451: DESIGN AND ANALYSIS OF EXPERIMENTS I (2 1 0)

Basic principles of experimentation. Randomization, replication mid blocking. Local control. Basic designs: completely randomized blocks, split plot, Missing values. Relative efficiency. Estimation and test of variance components. Multiple comparisons. Departures from underlying assumptions. Applications to agriculture, biology and industry.
Pre-requisite: STA211 or STA212

CSC415: MOBILE COMPUTING SYSTEMS DESIGN(10 1)

Wireless Communication Protocols and of Mobile Computing; Mobile Applications; Mobile Hardware Systems and Infrastructures; Mobile Software Systems, Android technology; Models of Mobile Computing Systems; Cloud Computing; Mobile Computing Programming Systems; Design and Implementation of Mobile Computing Systems;

CSC417: EMBEDDED SYSTEMS AND FIRMWARE DESIGN(1, 0, 1)

Microprogrammed Architectures; Principles pf Firmware Engineering; Real-time and Embedded System Concepts; ROM Programming; ROM size reduction techniques; Programmable Logic Arrays; Field Programmable Gate Arrays; (FPGAs); PROM/EPROM Programmers; Microprocessor-based systems Design; Micro-controllers; Wireless Modem: Hardware Design using Hardware Description Languages (HDLs); Real-time Operating Systems; Systems on a Chip; System Testing and fault Detection; Embedded network Devices; Virtual Machine Approach to System Design; introduction to Real-time Programming Languages; Case Studies and Design projects.
Pre-requisite: CSC301 or CSC302.

CSC419: COMPILER CONSTRUCTION II (1 01)
Grammars and Languages; Recognizers; Top-down and Bottom-up Parsers; Runtime Storage organization; Use of Display in Runtime Storage Organization; LR Grammars and Analyzers; Construction of LR Tables; Organization of Symbol Table; Storage allocation to run-time variables; Optimization Techniques; Code Generation.

CSC421: DATABASE SYSTEMS PROGRAMMING(2 0 1)
Review of Database Development Processes; Enterprise Modeling; Conceptual Data Modeling; Logical Database Design; Physical database Design; Database Implementation and Maintenance; Record Structure and File Organization for Relational, Distributed, Object-oriented, Multimedia, Deductive, and Temporal Databases; Design of User-Interface, I/O and Report Formats; Standard Query Languages (e.g. SQL, QBE, etc); Design and Implementation of Algorithms for Transactions Files Processing and Reports Generation; Automated Program and Report Generators; Detailed Study of a DBMS such as MS-Access, MySQL, Oracle, Sybase, DB2, IMS, etc; Mini-projects on database system design and development.*Pre-requisite: CSC403*

CSC423: CONCURRENT SYSTEMS PROGRAMMING (2 01)
Concurrent Systems Concepts; ACID Properties of Concurrent Transactions; Process Structuring; multi-threaded Processes; Co-routines; Inter-process Communications: Process Address Space; Pipelines; Asynchronous and Synchronous Message Passing; Deadlock and Prevention Algorithms; Resource Allocation Graph and Matrices; Concurrency Control Strategies: Mutual Exclusion; Semaphores; Conditional Critical regions; Monitors; Time-stamp Ordering; Two-phase Locking; Guided Commands; Crashes and Recovery Strategies; Concurrent Programming languages: Constructs; Object Models; Shared Monitors; Concurrent Execution Conditions: Task Serialization; Serialization Graph; Non-strict Execution Schedules; Features of Concurrent Programming Languages (e.g. Concurrent Pascal, concurrent-C, Modula, Turing Plus, Gypsy, PLISTS, etc); Operating System Support for Concurrent Program Development and User-thread Management; Case studies and projects.

CSC501: SOFTWARE ENGINEERING(201)
Software development process models; Requirements and specifications; Design methodologies: Objected-oriented, Component-based, knowledge-based, Experimental, Agent-based, Formal methods, Prototyping, etc; Data, process and flow design methodologies; Software metrics; Testing and quality assurance; Software test automation; Software maintenance; IEEE and other software standards; SE project management; CASE tools; Case studies and software design mini-projects for planning, control, communication, embedded systems, Internet, and agent-based applications, etc.*Prerequisite: CIT201 or CSC204*

CSC502: FORMAL MODELS OF COMPUTATION (2 0 1)

Review of formal grammar and languages; classification of grammars; Deterministic and Non-deterministic Automata; Regular set and Regular Expressions. Closure properties; Parsing; Sequential machines and finite state transducers. State minimization; Pushdown automata; Pushdown transducer; Turning machine as acceptor and transducer; Universal Turing machine; Church Thesis; Solvability and Solvability; Computable and Non-computable functions; Recursive functions. Halting problem; Relative Power of Formal Models; Abstract machine models design and software simulation exercises. *Prerequisite: CSC312.*

CSC503: INFORMATION SYSTEM MANAGEMENT(210)

Organizational Structures, Leadership Management Functions: Planning, Decision, Control and Motivation, Structure and organization of information systems: Components of information systems: Hardware, Software, and Staff structure; Management policies and functions; Integrated enterprise information system design; Information control; System specifications and design Enterprise Decision Support Systems: Resource Planning System (ERP) software such as SAP R/3 application development software suite. Information processing modes: Batch, Online, Real-time; File processing and report generation; Backup subsystem; Hardware/software failures and recovery strategies; Legal issues: Copyright and intellectual property laws. Computer installation management; OEM and Vendors; Managing IT: Enterprise and global management, planning and implementing change, security issues, ethical challenges. Effective corporate placement of EDP and EDP personnel administration; Scheduling operations; Technology of Database management; Planning a new installation; Site preparation; Evaluation of computer department; Management personnel; EDP management in multinational company; Systems auditing; Managerial Stress. Case studies involving Ecommerce systems development using electronic data interchange (EDI) software.

CSC504: COMPUTER GRAPHICS AND VISUALIZATION (2 0 1)

Operating modes. The light pen. Display control, converters, symbol generators, Line generators. Amplifiers. Cathode Ray Tube. CRT recorders. Direct-view storage tube. Automatic Mechanical plotting Boards. Interactive graphics display software. Three-dimensional rotation. Translation and perspective transformations. Hidden-line removal. Representation of threedimensional objects, reticular surfaces, coons' patches, B-splines. State-of-the- art application in design, controls and engineering analysis. Computer graphics Color Management; Computer graphics programming languages; Use of advanced graphics libraries (e.g. OpenGL and/or DirectX) for the implementation of the different concepts; Image types, storage, and retrieval algorithms; Images from scanners and digital cameras; Photo manipulation; Optimizing images. Image compression and decompression; Software (e.g. Adobe Photoshop Elements) for image creation and image database management.

CSC505: ALGORITHMIC TECHNIQUES FOR SMART SYSTEMS (200)

Background: AI and Agents; AI definition and areas, Agent definition, structure and types. Search: Exhaustive search, Heuristic search, Local search (e.g., hill-climbing), Constraint satisfaction, Adversarial search, Search under uncertainty. Logical Reasoning: Knowledge-based systems, Reasoning, Planning, Fuzzy logic. Probabilistic Reasoning: Quantifying uncertainty, Bayesian networks, Dynamic Bayesian networks.

CSC506: COMPUTER NETWORKS AND COMMUNICATION(201)

Network concepts: Network structures, architectures and protocols. Storage, delay, multiplexing, bandwidth sharing and dynamic bandwidth management, QoS. Channel organization, framing, channel access control. PSPDN and integrated digital networks; Open System Interconnection (OSI) and transmission control Protocol/ Internet Protocol (TCP/IP).

Network Topologies- LANs, WANs, Terminal Networks, Broadcast and Routed transmission. LAN contention and permission based Media Access Protocol, CSMA/CD. Token ring. Token Bus, Slatted ring, Client/Server models, RPC, FDDI, WAN-Circuit, Message and packet switching, PSDN and ISDN, X25. Routing algorithms. Internetworking: resolution of protocol variations. Repeaters, Hub, Bridges, Routers, Routers, gateways, protocol converters. Information to internet. TCP/IP-core Internet technology. Internet connectivity. Services on the Internet. Current trends on the internet. Network performance evaluation; Network modeling and simulation projects.

CSC507: DATA COMMUNICATION SYSTEMS DESIGNS(10 1)

Introduction to information theory: sources, measures, entropy, coding techniques; Introduction to waves analysis: Fourier series, Fourier transform; Z-transform; Analog/Digital data conversion; Data communication infra-structures; The OSI model, Data communication equipment; Modems, Hubs, Bridges, and their characteristics; Transmission channels; Synchronous and asynchronous transmission; Packet-switching data networks; Multiplexing (FDM, TDM, PCM), Error detection and correction: Internet protocols; Internet protocol addressing; Internet virtual private networks; Router and routing algorithms: Shortest path routing; distance vector routing, Multi-protocol label switching; Asynchronous transfer mode (ATM) network structure; Wireless LANs; Features of typical data communication software systems.

CSC508: SYSTEM PERFORMANCE EVALUATION(21 0)

Evaluation as disciplined enquiry; An overview of models and conceptualization: A historical overview; Planning alternative approaches to evaluation; assumptions underlying evaluation models and conceptualizations; Design standards; Influence of models on information systems; Impact of model building process; Applications of the Discrepancy Model: CIPP, Stake Countenance, Scriven, Provus, Kammond, Alkin, Tyler, Stufflebeam; Basic techniques of system performance evaluation: specific topics include performance modeling, discrete events simulation, verification and validation of simulation models, analysis of simulation output. Analysis of single-server queue and queuing networks; modeling of computer systems. Case studies of some real systems and models.

CSC509: NET-CENTRIC COMPUTING AND DATA SECURITY(1 01)

Network System Models; Distributed Computing; Mobile and Wireless Computing; International standard for Internet-based systems Network Database Design and Organization; Network Servers, Client/Server Computing using the Web; System hosting; Network Security measures; Web programming languages; Web database designs; media technologies; Search engines design; data security; Tools for design, Modelling, simulation testing, and validation of internet-based systems Building Web Applications;

CSC510: COMPUTER MODELLING AND SIMULATION(201)

Review of probability and decision-making under uncertainty; maximum and minimum regret rules; decision trees; forecasting regression analysis and times series analysis; queuing models; inventory and scheduling systems; times flow mechanisms; Mathematical models of computer I/O hardware device using mass-spring-dashpot analogues; Design of simulation program; analysis of results of simulation: validation of simulation models and results; introduction to simulation language (e.g. SIMULA, QSB+); case studies of computer modeling, simulation and forecasting in scientific, business and industrial applications.

CSC511: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (2 01)

Basic definitions: Data, knowledge, intelligence, artificial intelligence; Tree-structure representation of data/knowledge and Intelligent search methods; Basic Structure of knowledge-based system; Knowledge Engineering: Knowledge acquisition, knowledge

representation schemes, inference mechanisms, Explanation facilities; Introduction to subfields of AI: Expert systems technology, Fuzzy Systems, Machine learning, Genetic algorithms, Genetic programming, Symbolic Logic and Automated Reasoning, Neural networks, Approximate reasoning system, Game playing; Robots and Vision Systems; AI programming languages and systems: Lisp, Prolog, Smalltalk, Expert system shells; New trends; Applications and case studies.

CSC512: THE INTERNET OF THINGS(101)
General overview of internet of things (IoT). Cloud technology: Cloud Computing and Architecture, IoT Architecture, Planning an Architecture of IoT, Understanding IoT Protocols. Markets/Financial: understanding IoT as applied in Business, Business tools, IoT Business Models & benefits, Issues of IoT in Business. Blockchain Technology: understanding the Cryptocurrency technologies e.gBitCoin. Etherium, liteCoins, Benefits and challenges, etc. Security: IoT Device Security Mechanism, Flexibility level of protection required for the IoT, Challenges of securing IoT Communication. Privacy & User: Data & privacy, Big Data. Education: Educational Enhanced Learning – various E-learning tools (Course Management System, Game-based learning, Online Management System, Result processing system, etc), Design/User Experience: Designing for predictive Machine Learning for the IoT, How to design successful IoT Products, User Experience Design for predictive Mechanism for the IoT. Other IoT Applications. Course minor project.

CSC513: DATA MINING& BIG DATA ANALYSIS(2 01)
Overview of Data Mining; Data warehousing and OLAP; Big Data; Data Pre-processing; Data Cube Computation and Multi-dimensional Data Analysis; Mining Frequent Patterns, Associations, and Correlations; Data Classification: Data Partition Methods (e.g. k-means, hierarchical method; Density-based Method, etc); Data Mining Algorithm (e.g. Data Clustering, Classification, Prediction, etc); Databases for Data Mining Software Benchmarking; Data Mining Software Tools and Applications (e.g. WEKA); Data Mining Mini-Projects for Knowledge Discovery.*Pre-requisites: CSC 421*

CSC514: SPECIAL TOPICS IN SOFTWARE ENGINEERING (201)
Topics from process improvement; software re-engineering configuration management; Formal specification, software cost – estimation, Software architecture, Software patters, Software Reuse and Open source development.

CSC515: MICROPROCESSOR ARCHITECTURE (2 01)
Formal specifications of microprocessor functions, operations, and architecture; Comparison of current micro-processors: multi-chip; I/O organization; Assembler language; Comparison of instruction sets; address modes, stack operation subroutines; I/O data transfer; bus control, daisy chaining, handshaking etc; interrupt structures; program transfer, DMA for microcomputers, types of microprocessors; uses of microprocessor, micro-computer design for specific applications; micro-computer networking; interfacing micro-computer real time control; laboratory exercises.

CSC516: CRYPTOGRAPHY ALGORITHMS AND APPLICATIONS (2 0 1)
Overview and Introduction to Cryptography, Mathematical Background, Symmetric Cryptosystems, Stream Ciphers, Block Ciphers, Feistel Ciphers, Multiple Encryption, DES/AES, Hash Functions, Data Integrity, Authentication, MAC, Asymmetric Cryptosystems, Number Theory Background, Algorithmic Number theory, Probabilistic Primality Testing, True Primality Testing, Factoring Integers, RSA, Security of RSA Encryption, Security of RSA Key Generation, Discrete Logarithm Cryptographic Schemes, Diffe-Hellman, EIGamal, Key Establishment, Identification Protocols, Digital Signatures,

Public Key Management, ECC, Quantum Cryptography, Visual Cryptography, Lattice Cryptography.

CSC517: DISTRIBUTED COMPUTING SYSTEM DESIGN (20 1)
Classification of Distributed Systems; Distributed System Models; Communication Protocols; Remote Access Control; Remote Method Invocation; Stream-oriented Communication: Synchronization; Global State; Election; Distributed Mutual Exclusion; Distributed Database Design; Distribution Transparency; Commit Protocol and Concurrency Control; Two- and Three-phase Commit; Query Processing; Distributed Transactions; Naming: Generic Schemes; Domain Naming Schemes; Naming and Localization; Replication and Coherence; Consistency Models and Protocols; Fault tolerance; Group Communications; Check Points; Security Access Control; Key Management; Data Encryption; Distributed Operating Systems; Distributed File System and Services: NFS, Coda, etc. Mobile Computing; Distributed System and Network Programming.

CSC519: TOPICS IN INFORMATION TECHNOLOGY(210)
Web Server Administration; Web Development using Content Management Systems, Computer Forensics, computer Auditing, Information Technology Project Development and Management, Architecture and Organization of Enterprise Information System; Computer Network Administration, Multimedia Systems, Teleconferencing, Smart IT Devices/Tools. Information Security Risks, Analysis and Management. Information Disaster Recovery.

CSC521: ORGANIZATION OF PROGRAMMING LANGUAGES (200)
Classification of High-level Programming Languages; Language Definition Structure; Data Types and Structuring; Review of Basic Data Types including Lists and Trees; Control Structure and Data flows; Runtime Considerations; Interpretative Languages; Lexical Analysis and Parsing. Language design Project.

CSC555/556: PROJECT (0 0 6)
Each final-year student is expected to undertake a computer science related project. The project is to start within the first four (4) weeks of the Harmattan Semester of the student's final year. Each student will be assigned to a project supervisor. A formal report must be submitted before the second semester examinations begin. The student is required to defend his/her project before the Department and External Examiner.

STA501: STOCHASTIC PROCESSES(21 0)
Generating functions: tail probabilities and convolutions. Recurrent events. Random walk (unrestricted and restricted), Gamblers ruin problem. Markov processes in discrete and continuous time. Poisson, branching, birth and death processes. Queuing processes: M/M/1, M/M/S, M/A/1 queues and their waiting time distributions.

STA502: DECISION THEORY(210)
Empirical sources of knowledge – hypothesis, observation and experiment. Deductive sources of knowledge and scientific attitude. The concept of causation. Probability, a brief historical treatment to show conflicting definitions. Bayesian statistical methods in science. Principles of decision making. Utility functions and their properties. Role of uncertainty. Raves Strategies. Problems of prior and posterior distributions: value of prior information. Minimax strategies, Statistical inference. Theory of games.

STA513: SAMPLING THEORY AND SURVEY METHODS II (21 0)
Ratio, Regression and Difference estimation procedures. Double sampling. Interpenetrating scheme. Multiphase and multistage sampling. Cluster sampling with unequal sizes; problem of optimal allocation with more than one item. Further stratified sampling.

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE

ACADEMIC STAFF LIST

S/N, Name of Staff (Surname), Rank, SEX, Qualification, Area of Specialization

1, Prof. E. O. Nwachukwu, Professor, Male, B.Sc, M.Sc, PhD, Software Engineering, Networking
2, Prof. Asagba, Prince, Professor, Male, B.Sc, M.Sc, PhD, Network Security, Database Mgt System
3, Engr. Prof G. A. Chukwudebe, Professor, Female, PhD, Electronics and Computer
4, Engr. Prof. M. C. Ndinechi, Professor, Male, PhD, Communications
5, Prof. E. N. Erumaka, Professor**,** Male**,** B.Sc, M.Sc, PhD**,** Numerical Analysis & Computation, Real Analysis
6, Prof. (Mrs.) U. F. Eze, Professor, Female, PhD, Database and Information Systems
7, Prof. A. C. Onyeka, Professor, Male, PhD, Statistics and Computer
8, Prof. S. C, Inyama, **,** Professor**,** Male, B.Sc, M.Sc, PhD**,** Operations Research and Math. Modelling
9, Prof. F. K. Opara, Professor, Male, PhD, Data Communications
10, Engr. Dr. G. N. Ezeh, Reader, Female, PhD, Computer Engineering.
11, Engr. Dr. I. E. Achumba, Reader, Male, PhD, Electronics and Computer
12, Dr. H. C. Iwu, Senior Lecturer, Male, PhD, Statistics
13, Dr. K. B. Okeoma, Reader, Male, B.Sc, M.Sc, PhD**,** Materials Science
14, Dr. (Mrs.) E. Onugha, Senior Lecturer, Female, PhD, Mathematical Modelling
15, Dr. C. C. Nse, Reader, Male, B.SC., M.SC., Ph.D, Numerical Methods and Computation, Control Theory
16, Dr. O. F. Uzoh, Senior Lecturer, Male, B.Sc., M.Sc., Ph.D, Data Base Mgt System
17, Engr. Dr. O. C. Obiokonkwo, Senior Lecturer , Male, PhD, EE/IT Project Management
18, Dr. (Mrs) E. C. Nwokorie, Senior Lecturer, Female, B.SC, M.Sc, PhD , Data Communication, Software Eng.
19, Dr. (Mrs) J. N. Odii, Senior Lecturer, Female, B.Tech, M.Sc, PhD, Software Eng. & Data Communication
20, Dr. A. I. Otuonye, Senior Lecturer, Male, PhD, Software Engineering, MIS, Computer Programming
21, Dr. (Mrs.) J. Chukwuchekwa, Senior Lecturer, Female, PhD, Algebraic Systems
22, Dr. C. N. Njoku, Lecturer I, Male, B.Eng, M.Sc, Ph.D , Artificial Intelligence
23, Mr. J. I. Eke
, Lecturer I, Male, B.SC, M.Sc, Biometrics & Operating Systems
24, Dr. S. A. Okolie, Lecturer I, Male, B.Tech, M.Sc, PhD, Data/Cyber Security & Ubiquitous Computing
25, Dr. (Mrs) C. I. Onah, Lecturer I, Female, B.Tech, M.Sc, PhD, Astrophysics
26, Dr. A. C. Ohajianya, Lecturer I, Male, B.Tech, M.Sc, PhD, Solid State Electronics
27, Mr. D. E. Mbonu, Lecturer I, Male, B.SC, M.Sc., Real Analysis
28, Dr. (Mrs) U. C. Onyemauche, Lecturer I, Female, B.SC, M.Sc, PhD, Networks and Data Communication
29, Mr. A. O. Njoku, Lecturer I, Male, B.SC, M. Sc., Software Eng. & AI.
30, Mrs. J. C. Odirichukwu, Lecturer I, Female, B.Sc, M.Sc , Cybernetics & Robotics
31, Dr. A. C. Amadi, Lecturer II, Male, PhD, Networking & Information Technology
32, Dr. (Mrs) G. C. Onukwugha, Lecturer II, Female, B.Sc., M.Sc., PGDE, Ph.D, Pervasive Computing, DBMS
33, Mr. S. O. Diala, Lecturer II, Male, B. Tech., M.Sc, AI, Recommender Systems, Machine Learning & Internet Technology.
34, Mrs. L. C. Okpalla, Lecturer II, Female, B.Sc, M.Sc , Data Communication, Networking & Database
35, Mr. G. E. Ahamba, Asst Lecturer, Male, B.Tech., M.Sc, Virtual Reality & Web Design
36, Mr. A. Ejem, Asst Lecturer, Male, B. Tech., M.Sc, System Modeling & Simulation, Cloud Computing
37, Mrs. T. Onwuama , Asst Lecturer, Female, B. Tech., M.Sc, Software and Database
38, Mrs. F. O. Nwokoma , Asst Lecturer, Female, B. Tech., M.Sc, Human Computer Interaction & Database
39, Mr. U. C. Enwerem , Asst Lecturer, Male, B. Tech., M.Sc, Multimedia, Internet, Machine Learning, Data Mining
40, Mr. D. O. Njoku, Asst Lecturer, Male, B. Tech., M.Sc, AI, Embedded System & Automation
41, Mr. C. U. Betrand , Asst Lecturer, Male, B. Tech., M.Sc, Data Communication, Networking
42, Mr. K. Douglas, Asst Lecturer, Male, B. Tech., M.Sc, Embedded System & Automation
43, Mr. V. C. Iwuchukwu, GA, Male, B. Tech., Graphics, Cyber and Data Security
44, Mr. U. M. Obi, GA, Male, B. Tech., Cyber Security & Information Security.
45, Mr. Joseph Peter K., GA, Male, B. Tech., Networking & Information Security.
46, Mr. C. Ofoegbu, GA, Male, B. Tech., Internet Technology & Machine Learning

NON-TEACHING STAFF IN THE DEPARTMENT OF COMPUTER SCIENCE

A. Administrative Staff

S/N, NAME, RANK, DATE OF 1ST APPOINTMENT, DATE OF ASSUMPTION OF DUTY, DATE OF LAST PROMOTION/CONVERSION, QUALIFICATION

1, Mr. Ugwu Bede O., Chief SEC. Assistant, '01/07/91, '01/07/91, Oct. 01, 2011, NCE, B.Sc.Ed

2, Mrs Ezi Achama Eke, Snr Asst. Registrar, May 17, 2011, May 25, 2011, Oct. 01, 2014, B.Sc, PGDE, MBA, MSC

3, Iheukwumere Idu Emilia, Principal Executive Officer, August 12, 2011, Sept. 01, 2011, Oct. 01, 2014, HND

4, Okolie Modesta A., Snr. Computer Operator, January 09, 2012, April 23, 2012, Oct. 01, 2015, O'Level

5, Nworju Anna, P.C.O, January 14, 2003, January 14, 2003, Oct. 01, 2016, O'Level

B. Technical Staff

S/N, NAME, RANK, QUALIFICATION

1, Oforma F. J. , Asst. Chief Comp.
Technologist, BSc., BA, MBCS, AIMIS(Lond), IDPM(Lond), ANCS, NIRA

2, Egwu S. A, Snr. Comp. Technologist , B. Tech

3, Ikechukwu O., Technologist I, B.SC.

4, Ugbor Ihechiluru, Technologist I, B. Tech., HND

5, Osuagwu V. A., Technologist II, BSc

6, Ozoh Emmanuel N., Technologist II, BSc

8.0 ISSUES FACED BY STUDENTS IN THE DEPARTMENT

The following are issues faced by students in the Csc department of FUTO

8.1. Missing Script

Sometimes, students may not receive their scripts after taking an exam. This can be due to a number of reasons, such as the script being lost or misplaced, or the lecturer not having time to grade the scripts. When this happens, students may not be able to know how they performed on the exam, which can make it difficult to improve their grades.

Steps for rectifying the issue of missing script are:

a. Write a letter using stating your problem (the letter should be in the format given below)

b. Take it to your course advisor to acknowledge it by signing on it.

c. Take the letter with your school fees receipt and departmental receipt attached to the letter.

d. Submit it with your HOD'S secretary, the secretary will submit it to the HOD for signing

e. The letter will be transferred to the concerned lecturer (if it's a course for another department, the letter will be transferred to the concerned department HOD before going to the concerned lecturer)

f. When the lecturer is done, he/she will send the updated result or the script back to HOD then to your course advisor. Your course advisor then informs you.

Note: You will have to follow up on every stage to make sure every stage is handled.

8.2. Missing Lab Scores

Students may also not receive their lab scores. This can be due to a number of reasons, such as the lab instructor not having time to grade the work, or the scores being lost or misplaced. When this happens, students may not know how they are doing in the lab, which can make it difficult to pass the course.

Steps for rectifying the issue of missing lab scores are:

a. Write a letter using stating your problem (the letter should be in the format given below)
b. Take it to your course advisor to acknowledge it by signing on it.
c. Take the letter with your school fees receipt and departmental receipt attached to the letter.
d. Submit it with your HOD'S secretary, the secretary will submit it to the HOD for signing
e. The letter will be transferred to the concerned lecturer (if it's a course for another department, the letter will be transferred to the concerned department HOD before going to the concerned lecturer)
f. When the lecturer is done, he/she will send the updated result or the script back to HOD then to your course advisor. Your course advisor then informs you.

Note: You will have to follow up on every stage to make sure every stage is handled.

8.3. Irresponsible course adviser

A course adviser is a faculty member who is responsible for helping students plan their academic programs. They can help students choose courses, register for classes, and make sure that they are on track to graduate. However, some course advisers may not be very helpful. They may not be available to meet with students, or they may not be familiar with the requirements for the student's program. When this happens, students may have difficulty getting the help they need to succeed in their studies.

8.4. No knowledge about course schedule

Students may not know when their classes are scheduled or where they are located. This can be a problem, especially for new students who are not familiar with the campus. When students do not know where their classes are, they may be late or miss them altogether. This can hurt their grades and make it difficult to keep up with the material

8.5. No knowledge about the lecturers handling the respective course

Students may not know who their lecturers are or what their teaching styles are like. This can be a problem, especially if students have had negative experiences with lecturers in the past. When students do not know who their lecturers are, they may be apprehensive about taking their classes. This can make it difficult to learn the material and succeed in the course.

8.6. No knowledge about the Exam schedule

Students may not know when their exams are scheduled. This can be a problem, especially for students who have other commitments, such as work or extracurricular activities. When students do not know when their exams are, they may not be able to prepare properly. This can hurt their grades and make it difficult to pass the course

8.7. No knowledge about Course Test Date

Students may not know when their course tests are scheduled. This can be a problem, especially for students who have other commitments, such as work or extracurricular activities. When students do not know when their course tests are, they may not be able to prepare properly. This can hurt their grades and make it difficult to pass the course.

8.8 LETTER FORMATS

8.8.1 Letter Format of The Letter Needed to Rectify/Solve Missing Script Issue

Computer Science Department

School of Information and Communication Technology

Federal University of Technology, Owerri.

P.M.B 1526 Owerri

Imo State.

[dayst month, year].

To

The Head of Department,

[name of department you have missing script with],

Federal University of Technology, Owerri.

Through:

The Dean,

[name of school you have missing script with].

Through:

The Dean,

School of Information and Communication Technology.

Through:

The Head of Department,

Computer Science Department,

School of Information and Communication Technology,

Federal University of Technology, Owerri.

Through:

The Course Adviser,

[Year] Academic year

[Current level].

Dear Sir,

APPLICATION FOR RECTIFCATION OF OMITTED [COURSE NAME] EXAM SCORE

I [Name] with Registration number **[Reg Number]**, a student of computer science Department, [Current Level] write for rectification of my omitted **[Course] Exam Score.**

I registered for the course, wrote the test and exam and attended all lab practicals but my exam score was totally omitted in the result sent to my department.

It will be a great pleasure if my result is recompiled and sent to my department.

Yours Faithfully,

[Name]

[Phone Number]

8.8.2 Letter Format of the letter needed to rectify/solve missing lab score issue

Computer Science Department

School of Information and Communication Technology

Federal University of Technology, Owerri.

P.M.B 1526 Owerri

Imo State.

[dayst month, year].

To

The Head of Department,

[name of department you have missing lab scores with],

Federal University of Technology, Owerri.

Through:

The Dean,

[name of school you have missing lab scores with].

Through:

The Dean,

School of Information and Communication Technology.

Through:

The Head of Department,

Computer Science Department,

School of Information and Communication Technology,

Federal University of Technology, Owerri.

Through:

The Course Adviser,

[Year] Academic year

[Current level].

Dear Sir,

APPLICATION FOR RECTIFCATION OF OMITTED [COURSE NAME] LAB SCORE

I [Name] with Registration number **[Reg Number]**, a student of computer science Department, [Current Level] write for rectification of my omitted **[Course] Lab Score.**

I registered for the course, wrote the test and exam and attended all lab practicals but my lab score was totally omitted in the result sent to my department.

It will be a great pleasure if my result is recompiled and sent to my department.

Yours Faithfully,

[Name]

[Phone Number]