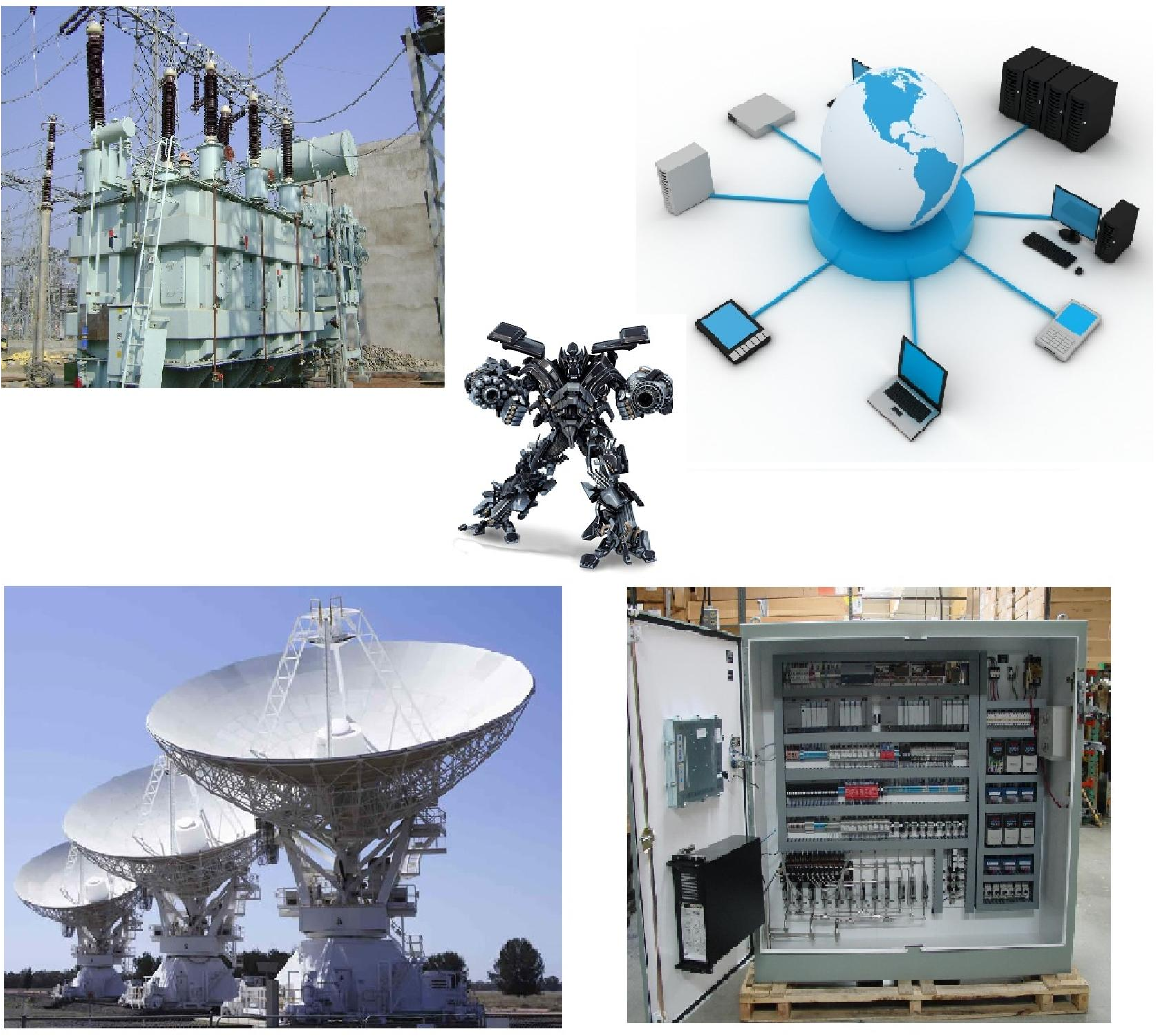


DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, KWARA STATE UNIVERSITY MALETE, KWARA STATE



STUDENTS’ HANDBOOK

**2023**

“...to make the institution a university of the first choice in Nigeria through the introduction of the best practice in academic culture and staff welfare programmes.”

**Professor Shaykh Luqman JIMOH**

B.A (Unilorin), M.A(UI), PhD (LASU)

**Ag. Vice Chancellor**

“...Applying innovatively, engineering and technology for infrastructural development”

**Engr. Prof. AbdulGaniyu Alabi** *Ph.D., M.Sc./DIC, B.Sc., FNSE, SPX, R.Engr.*

**Dean, Faculty of Engineering and Technology**

“...Producing engineering graduates with a unified vision for analyzing and designing energy, signals and information processing systems”

**Engr. Dr. Lambe Mutalub Adeshina**

*B.Eng. (Ilorin), M.Eng. (BUK), Ph.D. (Ibadan), MNSE, R.Engr.*

**Head of Department, Department of Electrical and Computer Engineering**

**ELECTRICAL AND COMPUTER ENGINEERING (ECE)**

### Preface

The purpose of the Handbook is designed to assemble in one location information on undergraduate engineering programs in Electrical and Computer Engineering at the Faculty of Engineering and Technology of Kwara State University.

**TABLE OF CONTENTS**

[Preface 2](#_TOC_250013)

Contents 3

[History of the Programme 4](#_TOC_250012)

[Programme Title 4](#_TOC_250011)

[Philosophy and Objectives 4](#_TOC_250010)

[Admission Requirements 5](#_TOC_250009)

[Academic Regulations 6](#_TOC_250008)

[Registration for Courses 7](#_TOC_250007)

[Student Performance Evaluation 7](#_TOC_250006)

[Degree to be Awarded 8](#_TOC_250005)

[Minimum Graduation Requirements 9](#_TOC_250004)

[Staffing 11](#_TOC_250003)

[Departmental Course Outlines and Curricula 14](#_TOC_250002)

[Course Description 21](#_TOC_250001)

[Prospect for Graduate 49](#_TOC_250000)

## HISTORY OF THE PROGRAMME

The Engineering programmes of the Kwara State University commenced a year after the take-off of the university in 2009 with the establishment of the Faculty of Engineering and Technology. The Electrical and Computer Engineering opened its doors for admission that year with two pioneering students drawn from the Faculty of Pure and Applied Science.

The department actually took off officially in January 2013 with the appointment of a Head of Department supported by a couple of Senior Adjunct Lecturers and some Assistant Lecturers. Immediately thereafter, the department quickly defined as its goal the production of well-trained engineers who can function well in a broad range of professional activities such as teaching, research and development, design, manufacturing, consultancy services, maintenance, operation, marketing, sales and management.

Henceforth, the department plans to cut across the established boundaries while working to provide deep support and collaboration with other disciplines.

## PROGRAMME TITLE

The department received the Nigerian University Commission formal approval in October 2013, to run two programmes leading to the award of:

1. Bachelor of Engineering (B.Eng.) in Electrical and Electronics Engineering
2. Bachelor of Engineering (B.Eng.) in Computer Engineering.

## PHILOSOPHY AND OBJECTIVES

The philosophy of the programme is to produce graduate with high academic standard, adequate practical background to make them upon graduating, of immediate value to industry and the nation in general; and be self-employable. The programme is divided into five years of lectures and practical, coupled with four intervening Industrial-Training periods to enable the engineering students acquire the necessary skills to be able to solve local problems by the time they graduate.

The Electrical and Computer Engineering programmes are designed to provide students with a unified vision for analysing and designing power system and machineries, energy,

signals and information processing systems, communication systems, control and instrumentation, electronics and computer systems.

The objectives of electrical and computer engineering programme are to:

1. design curriculum that covers wide and dynamic electrical and computer engineering principles;
2. introduce students to all levels of abstractions on which analysis and synthesis of electrical, electronic, computer and information systems are based and also provide a unique approach to learning in such a way to challenge the intellect and cultivate creativity.
3. produce graduates who are well exposed to extensive theories, appropriate laboratory experiments and practical work experience; such that they become the future manpower for private and public sectors of the economy.
4. produce graduates that are resourceful, creative, knowledgeable and equipped in design, develop new products and production techniques, implementation, maintenance and management of electrical, electronics and computer system such that they create jobs;
5. produce graduate that can install and maintain complex engineering systems so that they can perform optimally in our environment.
6. produce graduate that can manage people, fund, materials and equipment. Improve on indigenous technology to enhance local problems solving capability.

# ADMISSION REQUIREMENTS

1. **UNIFIED TERTIARY MATRICULATIONS (UTME)**
   1. Unified Tertiary Matriculations Examination (UTME) is conducted by the Joint Admissions and Matriculations Board (JAMB). A candidate seeking admission into the Faculty through this means must attain at least, the minimum required standard in the entrance examination normally called the ‘cut-off mark’ in the following subjects: English, Mathematics, Physics and Chemistry. This cut-off mark is set by the University admissions board based on information from JAMB on session-by-session basis. Normally, the University wide cut-off mark for a particular session will not be

less than the JAMB cut-off mark. In addition, the Faculty of Engineering and Technology as well as the department may have, from time to time, further requirements which may be different but not less than the University wide requirement.

* 1. In addition to (i), UTME candidates must obtain O’Level credit passes at not more than two sittings in English and at least four science subjects which must include Mathematics, Physics and Chemistry. A credit pass in Further Mathematics will be considered a plus.

1. **DIRECT ENTRY (DE)**
   1. DE candidates into 200 level must attain at least the cut-off mark which will be set by the University in its Post-UTME screening examination.
   2. In addition to (i), such candidates must obtain A-Level/IJMB or approved equivalent pass in Mathematics, Physics and Chemistry or a National Diploma (ND) in a relevant engineering field (as determined by the department) at distinction or Upper credit level. The ND must be from a recognized Polytechnic or Faculty of Technology with one- year industrial attachment.
   3. For DE admission into 300 level, a candidate must possess HND Upper Credit grade (minimum) in addition to (i) and (ii).

## ACADEMIC REGULATIONS

**Introduction**

* 1. The academic programmes of the University are based on the course system.
     1. A course is any part or whole of a subject which can be completed through lectures, tutorials and/or practicals within a specified number of hours in a semester;
     2. Courses are normally weighted in terms of course units ranging from one to four.
     3. A course unit is defined as subject matter completed in fifteen lecture hours, or 45 practical hours. Whenever tutorials are included in the instructions, they are rated as lecture hours.

2.0 Evaluation of courses can be in terms of lecture hours alone or in combination with tutorials and practical hours.

* 1. Categories of courses for undergraduate programmes include:
     1. **Compulsory (C):** These courses must be taken and passed before graduating from any degree progamme. They could be University wide compulsory or specific programme core courses. They are designed for each degree programme and not subject to any choice by students.
     2. **Required (R):** These courses must be taken and passed before graduating from the degree programme. They are core courses specific to the programme but are not taught in the department. They are not subject to any choice by students.
     3. **Electives (E):** These courses are left for students to choose to make up their work load or degree requirements. They should be relevant to respective programmes but may be chosen from their field or outside. However, the prescribed minimum number of units from such courses must also be passed before the student can graduate.
     4. **Pre-requisites (PR):** These are courses which students must take and pass before taking a particular course at a higher level.

## REGISTRATION FOR COURSES

Registration of courses is done according to the University tradition. Courses for the session are registered on-line at the beginning of the session. In addition, a student is required to go to his/her level adviser after the on-line registration in order to complete the registration process. Failure to register before the deadline as stipulated by the University may result in loss of the session or voluntary withdrawal from the programme. A student cannot re-register for a course already passed. For all regular semester, students are required to register a minimum of eighteen (18) and maximum of twenty-four (24) credit units.

## STUDENT PERFORMANCE EVALUATION

Performance of students in a course shall normally be evaluated through examination, continuous assessment and attendance. The pass mark is 45% with Continuous Assessment carrying a maximum of 40% of total marks for the course. Such Continuous Assessment would take the form of attendance, assignments, test, laboratory/ studio/ workshop/ field/ exhibition or combination thereof, as may be applicable to respective courses. A student must also satisfy 70% attendance of lectures before being allowed to sit for examination in the respective course.

1. Students in the Faculty of Engineering and Technology shall be required to have at least a **CGPA of 1.50** at the end of first year to proceed to 200 level. In addition, such student MUST pass at least 9 credits of Mathematics, 8 credits of Physics and 7 credits of Chemistry.
2. At the end of the third year, ONLY students without carry over courses or whose carry over courses can be accommodated in the final year shall be allowed to proceed for Student Industrial Work Experience Scheme II (SIWES II) in the second semester of the fourth year.
3. External examiner shall be employed in the final year of the undergraduate programme to assess final year courses and projects, and to certify the overall performance of the graduating students, as well as the quality of facilities and teaching. All others would be internally moderated by Senior Faculty members
4. The University operates a 4-point grading system. The marks obtained from the registered courses shall be converted to letter grades and transformed to points as follows:

|  |  |  |
| --- | --- | --- |
| **% Score** | **Grade** | **Grade Point** |
| 70 – 100 | A | 4.0 |
| 60 – 69 | B | 3.2 |
| 50 – 59 | C | 2.4 |
| 45 – 49 | D | 1.6 |
| 0 – 44 | F | 0.0 |

## DEGREE TO BE AWARDED

Upon the successful completion of the programme and having been found worthy in character and learning, the Senate of Kwara State University shall award a B.Eng. in Electrical and Electronics Engineering programme to the candidate. The class of this degree shall be classified as follows:

|  |  |
| --- | --- |
| **Class of Degree** | **CGPA** |
| First Class (Honours) | 3.60-4.00 |
| Second Class (Honours) Upper Division | 2.80-3.59 |
| Second Class (Honours) Lower Division | 1.92-2.79 |
| Third Class (Honours) | 1.20-1.91 |

## MINIMUM GRADUATION REQUIREMENTS

1. **University Requirements: 19 credits**

Every Undergraduate student of Kwara State University must take and pass the entire 13 credit units of General Studies Courses and 6 credit units of Entrepreneurship Courses of the Enterprise Creation and Skill Acquisition (ECSA) Programme approved by the University Senate which are enumerated as follow:

**General Studies Courses (GNS)**

|  |  |  |
| --- | --- | --- |
| Course Code | Course Title | Units |
| GNS 101 | Use of English I | 2 |
| GNS 102 | Use of English II | 2 |
| GNS 103 | Computer Appreciation I | 1 |
| GNS 104 | Computer Appreciation II | 1 |
| GNS 106 | Use of Library | 1 |
| GNS 201 | Foreign Language I (French/ Arabic/Spanish/Portuguese) | 1 |
| GNS 202 | Foreign Language II (French/ Arabic/Spanish/Portuguese) | 1 |
| GNS 301 | General Science & Environment | 2 |
| GNS 302 | Religion, Ethics and Leadership | 2 |
| TOTAL |  | **13** |

**Enterprise Creation and Skill Acquisition (ECSA) Courses**

|  |  |  |
| --- | --- | --- |
| Course Code | Course Title | Units |
| GNS 203 | Innovation & Product Development | 2 |
| GNS 204 | Enterprise creation & Development | 2 |
| GNS 303 | Entrepreneurship Mentorship | 1 |
| GNS 304 | Enterprise Resource Planning/Business Plan | 1 |
| TOTAL |  | **6** |

However, the GNS rules have changed from above for 100 level students of the 2020/2021 Academic session.

The following modification rules must be noted:

* 1. The new GNS rules fully apply to the 100 level students of the 2020/2021 academic session.
  2. The rule also applies to 100 level GNS courses to be done by the DE students in 200 level for 2020/2021 academic session. The previous GNS rule applies to DE student from 200 level and above.
  3. All students for 200 to 500 level for 2020/2021 academic session are expected to register the GNS they failed in case of carry over. The new GNS rule does not apply to carry over GNS courses.

The new GNS rules are stated as follow:

FET students are to take three (3) compulsory GNS (101, 102, and 108). Additional, FET students are required to take GNS 206 and GNS 307 to make total of nine (9) units for GNS courses.

|  |  |  |
| --- | --- | --- |
| Course  Code | Course Title | Units |
| GNS 101 | Use of English I | 2 |
| GNS 102 | Use of English II | 2 |
| GNS 108 | Use of Library, Study Skills and ICT | 2 |
| GNS 206 | Introduction to Entrepreneurship | 2 |
| GNS 307 | Politics and Inter-Governmental Relations | 1 |
| TOTAL |  | **9** |

**Enterprise Creation and Skill Acquisition (ECSA) Courses**

|  |  |  |
| --- | --- | --- |
| Course Code | Course Title | Units |
| VTE 203 | Innovation & Product Development | 2 |
| VTE 204 | Enterprise creation & Development | 2 |
| VTE 303 | Entrepreneurship Mentorship | 1 |
| VTE 304 | Enterprise Resource Planning/Business Plan | 1 |
| TOTAL |  | **6** |

1. **GET courses: 57 credits**

In addition, a student graduates when he/she has passed all the core courses prescribed by the Faculty of Engineering and Technology dubbed General Engineering and Technology courses (GET) totalling 57 credits.

1. **Departmental courses:**

In addition to the GET courses, a student must pass the required credits prescribed by the Departments of Electrical and Computer Engineering to graduate. These include all core courses and optional electives.

|  |  |  |
| --- | --- | --- |
| **Academic**  **year** | **Minimum credits required** | **Cumulative minimum**  **credits** |
| **300 level** | 30 | 30 |
| **400 level** | 25 | 55 |
| **500 level** | 33 | **88** |

# STAFFING

**TEACHING STAFF**

**Departmental Lecturers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Name of Staff** | **COREN No.** | **Rank/Destination** | **Qualification** |
| 1 | Engr. Dr. Lambe M. ADESHINA | R.6,695 | Associate Professor (HOD) | B.Eng. (Ilorin), M.Eng. (BUK), Ph.D. (Ibadan), MIEEE, MNSE, R. Engr. |
| 2 | Engr. Dr. Joe Oladosu ONI | R.4,773 | Associate Professor | B.Eng. (ABU), MSEE. (Pitts), Ph.D., MIEEE, MNSE, R. Engr. |
| 3 | Engr. Dr. Abdulwaheed MUSA | R.26,501 | Senior Lecturer | B.Eng., M.Eng., Ph.D., Snr. IEEE, R. Engr. |
| 4 | Engr. Dr. Olalekan OGUNBIYI | R.30,678 | Senior Lecturer | B.Eng., M.Eng., Ph.D. (Ilorin), MIEEE, MNSE, R. Engr. |
| 5 | Engr. Dr. Bilkisu J. OJUOLAPE | R.36,984 | Lecturer 1 | B.Sc. (Ghana), M.Sc. (Loughborough), PhD, MNSE, R. Engr. |
| 6 | Engr. Dr.. Monsurat O. BALOGUN | R.36,799 | Lecturer 1 | B.Tech., M.Sc., PhD (LAUTECH), MNSE, R. Engr. |
| 7 | Engr. Emmanuel S. OLUWASOGO | R.27,474 | Lecturer I | B.Eng. (Ilorin), M.Eng. (Lagos), MIEEE, R. Engr. |
| 8 | Engr. Muheeb O. AHMED | R.37,540 | Lecturer 1 | B.Eng. (Ago Iwoye), M.Sc. (Nottingham), IEEE, MNSE, R. Engr. |

**Visiting Lecturers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Name of Staff** | **No.** | **Rank/Destination** | **Qualification** |
| 9 | Prof. Zacchaeus K. ADEYEMO | R.10,536 | Professor | B.Eng., M. Eng (Ilorin)., Ph.D. (Ogbomoso), MIEEE, MNSE, R.Engr. |
| 10 | Prof. Ganiyu A. AJENIKOKO | R.10,355 | Professor | B.Eng., M.Eng. (Ilorin), Ph.D. (Ogbomoso), MNSE, R. Engr. |
| 11 | Dr A. A. OLOYEDE | R.26,132 | Associate Professor | B. Eng (BUK), M. Sc. (York), Ph.D. (York), R. Engr. |
| 12 | Dr Ibrahim OLADIMEJI | R.21,237 | Senior Lecturer | B. Eng (Ilorin), M. Sc. (Glassgow), Ph.D. (Malaysia), MNSE, R. Engr. |
| 13 | Dr. Damilare O. AKANDE | R.13,970 | Associate Professor | B. Tech (Ogbomoso), M. Sc. (Ile Ife), Ph.D. (Ogbomoso), MIEE, MIEEE, MNSE, R. Engr. |

**Associate Lecturers**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Name of Staff** | **No.** | **Rank/Destination** |
| 15 | Prof. A. G. F. ALABI | R.9,576 | Professor (Material Science Engineering Dept.) |
| 16 | Prof. C. O. ODETUNDE | R.3,302 | Full Professor (Aero. & Astro. Engineering Dept.) |
| 17 | Dr. A. B. IBITOYE | R.15,198 | Associate Professor (Civil Engineering Dept.) |
| 18 | Dr. Ganiyu ADEOGUN | R.23,450 | Associate Professor (Civil Engineering Dept.) |
| 19 | Dr. Samson O. ODEYEMI | R.19,226 | Associate Professor (Civil Engineering Dept.) |
| 20 | Dr. Adeshina FADEYIBI | R.33,462 | Associate Professor (Food Agric. & Bio. Engr. Dept.) |
| 21 | Dr Kabiru MUSTAPHA |  | Associate Professor (Material Science Engineering Dept.) |
| 22 | Dr. R. A. BUSARI | R.25,171 | Senior Lecturer (Food Agric. & Bio. Engineering Dept.) |
| 23 | Dr. Kamoru O. OLADOSU | R.21,997 | Senior Lecturer (Mechanical Engineering Dept.) |
| 24 | Dr. Morakinyo W. KAREEM | R.15,670 | Senior Lecturer (Mechanical Engineering Dept.) |
| 25 | Dr. Maruf O. KOLAWOLE | R.33,571 | Lecturer I (Mechanical Engineering Dept.) |
| 26 | Dr. Olayinka OLAOGUN | R.32,269 | Lecturer I (Mechanical Engineering Dept.) |
| 27 | Engr. Olalekan OLAYEMI | R.32,090 | Lecturer I (Aero. & Astro. Engineering Dept.) |

**TECHNICAL STAFF**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | **Name** | **Qualifications** | **Rank/Status** |
| 1 | Tgst. Abdulazeez AKANDE | ND, HND | Ass. Chief Technologist |
| 2 | Tgst. Musiliu ABOLAJI | ND, HND | Senior Technologist |
| 3 | Tgst. Abdulrasheed ABIODUN | ND, HND | Senior Technologist |
| 4 | Tgst. Kasim SULAYMAN | ND, HND, | Technologist I |
| 5 | Tgst. Abdul Rafiu Yussuf | ND, HND | Technologist I |

**ADMINISTRATIVE STAFF**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/NO** | **Name** | **Qualification** | **Rank** |
| 1 | Yusuf Sirajudeen Omoiya | HND (Public Administration), | Departmental Secretary |

## DEPARTMENTAL COURSE OUTLINES AND CURRICULA

**B.Eng. Electrical and Electronics Engineering**

**100 Level Harmattan Semester Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | CHM 131 | General Physical Chemistry | 3 | R |
| 2 | CHM 151 | Practical Chemistry I | 1 | R |
| 3 | MTH 101 | Elementary Mathematics (Math I) | 3 | R |
| 4 | MTH 103 | Elementary Diff. and Integral Cal. | 3 | R |
| 5 | STA 101 | Introduction to Probability | 2 | R |
| 6 | PHY 101 | General Physics (Physics I) | 4 | R |
| 7 | PHY 103 | Experimental Physics I | 1 | R |
| 8 | GNS 101 | Use of English I | 2 | C |
|  | **Total** |  | **19** |  |

**100 Level Rain Semester Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | CHM 112 | General Inorganic Chemistry | 3 | R |
| 2 | CHM 122 | General Organic Chemistry | 2 | R |
| 3 | CHM 152 | Practical Chemistry II | 1 | R |
| 4 | MTH 102 | Elementary Mathematics II | 3 | R |
| 5 | MTH 104 | Elementary Algebra and Trig. | 3 | R |
| 6 | PHY 104 | General Physics Lab. | 1 | R |
| 7 | PHY 102 | General Physics II | 4 | R |
| 8 | STA 102 | Intro. to Probability Distribution | 2 | R |
| 9 | GNS 102 | Use of English II | 1 | C |
| 10 | GNS 108 | Use of Library, Study skills and ICT | 2 | C |
|  | **Total** |  | **22** |  |

**200 Level Harmattan Semester Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | GET 201 | Applied Electricity I | 3 | C |
| 2 | GET 215 | Engineering Graphics I | 2 | C |
| 3 | GET 233 | Engineering Technology | 2 | C |
| 4 | GET 241 | Fundamentals of Fluid Mechanics | 3 | C |
| 5 | GET 251 | Engineering Mechanics I | 2 | C |
| 6 | GET 261 | Computer Programming I | 1 | C |
| 7 | GET 263 | Engineering Mathematics I | 3 | C |
| 8 | GET 283 | General Engineering Lab. Course I | 2 | C |
| 9 | VTE 203 | Enterprise creation and development | 0 | C |
|  | **Total** |  | **18** |  |

**200 Level Rain Semester Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | GET 202 | Applied Electricity II | 3 | C |
| 2 | GET 216 | Engineering Graphics II | 2 | C |
| 3 | GET 242 | Fundamental of Thermodynamics | 3 | C |
| 4 | GET 252 | Engineering Mechanics II | 2 | C |
| 5 | GET 262 | Computer Programming II | 2 | C |
| 6 | GET 264 | Engineering Mathematics II | 3 | C |
| 7 | GET 272 | Engineering Materials | 2 | C |
| 8 | GET 284 | GET Labs. Course II | 2 | C |
| 9 | GNS 206 | Introduction to Entrepreneurship | 2 | R |
| 10 | VTE 204 | Innovation and product development | 0 | C |
|  | **Total** |  | **21** |  |

**Direct Entry Students are to register the following courses**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | S/N | Course Code | Course Title | Course Status | Credit Unit |
| Harmattan | 1 | GNS 101 | Use of English I | C | 2 |
| Rain | 1 | GNS 102 | Use of English II | C | 2 |
| 2 | GNS 108 | Use of Library, Study skill and ICT | C | 2 |

**200 Level Long Vacation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| **1** | GET 222 | Student Work Experience Programme (SWEP) | 3 | C |

**300 Level Harmattan Semester Courses**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | | | **Course Title** | **Credit Unit** | | **Course Status** | |
| 1 | | ECE 315 | Electric Circuit Theory I | | | 3 | | C |
| 2 | | ECE 321 | Electronic Circuit I | | | 3 | | C |
| 3 | | ECE 331 | Electromagnetic Fields and Waves I | | | 3 | | C |
| 4 | | ECE 341 | Data Comm. & Computer Networks | | | 3 | | C |
| 5 | | ECE 361 | Electrical Machines I | | | 3 | | C |
| 6 | | ECE 381 | Laboratory Course and Mini Project I | | | 1 | | C |
| 7 | | GET 361 | Engineering Mathematics III | | | 3 | | C |
| 8 | | GET 373 | Engineer in Society | | | 1 | | C |
| 9 | | GNS 307 | Politics and Inter-Governmental Relations | | | 1 | | R |
| 10 | | VTE 303 | Entrepreneurship Mentorship | | | 0 | | C |
|  | | **Total** |  | | | **21** | |  |

**300 Level Rain Semester Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | ECE 312 | Measurement and Instrumentation | 2 | C |
| 2 | ECE 316 | Electric Circuit Theory II | 3 | C |
| 3 | ECE 322 | Electronic Circuit II | 3 | C |
| 4 | ECE 342 | Applied Computer Programming | 2 | C |
| 5 | ECE 362 | Electrical Machines II | 3 | C |
| 6 | ECE 382 | Laboratory Course & Mini Project II | 1 | C |
| 7 | GET 302 | Engineering Economics | 3 | C |
| 8 | GET 362 | Engineering Mathematics IV | 3 | C |
| 9 | GET 376 | Engineering Communication | 1 | C |
| 10 | VTE 304 | Enterprise Resource Planning | 2 | E |
|  | **Total** |  | **21** |  |

**400 LEVEL HARMATTAN SEMESTER COURSES**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | | **Course code** | | **Course Title** | **Credit Unit** | | | **Course Status** |
| 1 | ECE 421 | | Digital Electronics | | | 3 | C | |
| 2 | ECE 431 | | Electromagnetic Fields and Waves II | | | 2 | C | |
| 3 | ECE 441 | | Control Engineering I | | | 3 | C | |
| 4 | ECE 445 | | Assembly Language Programming | | | 2 | C | |
| 5 | ECE 451 | | Principles of Communication Engineering | | | 3 | C | |
| 6 | ECE 471 | | Electric Power Principles | | | 3 | C | |
| 7 | ECE 481 | | Laboratory course and Mini Project III | | | 1 | C | |
| 8 | CVE 485 | | Civil Engineering Practice | | | 2 | C | |
| 9 | GET 463 | | Engineering Statistics | | | 2 | C | |
|  | **Total** | |  | | | **21** |  | |

**400 LEVEL RAIN SEMESTER COURSES**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| **1** | ECE 392 | Student Industrial Work Experience Scheme 1 (SIWES I) | 2 | C |
| 2 | ECE 492 | Student Industrial Work Experience Scheme II (SIWES-II) | 6 | C |
| 3 | GET 222 | Student Work Experience Programme (SWEP) | 3 | C |
|  |  | Total | 11 |  |

**500L LEVEL HARMATTAN SEMESTER COURSES**

**Common Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | GET 501 | Engineering Management | 2 | C |
| 2 | ECE 503 | Design of Electrical and ICT Services | 2 | C |
| 3 | ECE 523 | Power Electronics | 2 | C |
| 4 | ECE 561 | Electric Energy Conversion and Storage | 2 | C |
| 5 | ECE 591 | Electrical and Compt. Engr. Project I | 3 | C |
|  | **Total** |  | **11** |  |

**Power System and Electrical Machine Option**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | | **Course Code** | | **Course Title** | | **Credit Unit** | | **Course Status** |
| 1 | ECE 563 | | Electrical Machine Design | | 3 | | C | |
| 2 | ECE 573 | | Electric Power System Engineering | | 3 | | C | |
| 3 | ECE 575 | | Power System Comm. and Control | | 2 | | E | |
|  | **Total** | |  | | **8** | |  | |

**Communication Engineering Option**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | ECE 551 | Satellite Communications | 3 | C |
| 2 | ECE 553 | Mobile and Wireless Comm. System | 3 | C |
| 3 | ECE 555 | Digital Communication Principle | 2 | E |
|  | **Total** |  | **8** |  |

**Computer and Control Engineering Option**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Unit** | **Course Status** |
| 1 | ECE 531 | Introduction to Robotic and Automation | 2 | E |
| 2 | ECE 541 | Microprocessor & Embedded System Design | 3 | C |
| 3 | ECE 545 | Control Engineering II | 3 | C |
|  | **Total** |  | **8** |  |

**500L LEVEL RAIN SEMESTER COURSES**

**Common Courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Units** | **Course Status** |
| 1 | GET 502 | Engineering Law | 2 | C |
| 2 | ECE 504 | Reliability & Maintainability of Electrical System | 3 | C |
| 3 | ECE 532 | Modelling and Simulation | 2 | C |
| 4 | ECE 592 | Electrical and Compt. Engr. Project II | 3 | C |
|  | **Total** |  | **10** |  |

**Power System and Electrical Machine Option**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Units** | **Course Status** |
| 1 | ECE 564 | Power System Protection | 3 | C |
| 2 | ECE 576 | Power System Control and Stability | 3 | C |
| 3 | ECE 578 | Compt. Application in Power Systems | 2 | E |
|  | **Total** |  | **8** |  |

**Communication Engineering Option**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Units** | **Course Status** |
| 1 | ECE 552 | Digital Signal Processing | 3 | C |
| 2 | ECE 554 | Optical Fibre Communication System | 2 | E |
| 3 | ECE 556 | Broadcasting and Internet Technology | 3 | C |
|  | **Total** |  | **8** |  |

**Computer and Control Engineering Option**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Course Code** | **Course Title** | **Credit Units** | **Course Status** |
| 1 | ECE 524 | Industrial Electronics | 2 | E |
| 2 | ECE 542 | Digital Systems Design & VHDL Programming | 3 | C |
| 3 | ECE 546 | Digital Control Engineering | 3 | C |
|  | **Total** |  | **8** |  |

**Direct Entry Students are to register the following course**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **S/N** | **Course Code** | **Course Title** | **Course Status** | **Credit Unit** |
| Rain | 1 | GNS 108 | Use of Library, Study skill and ICT | C | 2 |

## COURSE DESCRIPTION

**GENERAL STUDIES (GNS) COURSES**

|  |  |  |  |
| --- | --- | --- | --- |
| GNS 101 | Use of English I | 2 | C |

Information collection and usage. Collection and organization of materials. Logical of presentation of Papers. Use of the Library, Reference Sources, techniques of fast reading and writing. Continuous writing, oral communication, public speaking and phonetic .

|  |  |  |  |
| --- | --- | --- | --- |
| GNS 102 | Use of English II | 2 | C |

A basic course in effective listening skills. Use of the English Language relevant to students’ disciplines. Structure of the sentence types. Verbs. Classification of nouns, punctuation. Writing of essays. Sentence construction. Outlines and paragraphs.

|  |  |  |  |
| --- | --- | --- | --- |
| GNS 108 | Use of Library, Study Skills and ICT | 2 | R |

Brief history of libraries; Library and education; University libraries and other types of libraries;

Study skills (reference services); Types of library materials, using library resources including e- learning, e-materials, etc.; Understanding catalogues (card, POAC, etc.) and classification; Copyright and its implications; Database resources; Bibliographic citations and referencing. Development of modern ICT; Hardware technology; Software technology; Input devices; Storgae devices; Output devices; Communication and internet services; Word processing skills (typing, etc.).

|  |  |  |  |
| --- | --- | --- | --- |
| VTE 203 | Innovation & Product Development | 2 | C |

This is the first stage of the ECSA Programme and it is aimed at enlightening the students on creative business ideas and opportunities. The end result is for each student to come up with a creative business idea by the end of the semester. The course is expected to put the students through the following: The Definitions of Creativity and Innovation, The Misinterpretations of Innovation, The Sources of Innovative Opportunities, Creativity and Product Development Process, Product Planning and Execution, The Market, the Target, the Customer, and the Creativity Sessions/ Presentation of Creative Ideas.

|  |  |  |  |
| --- | --- | --- | --- |
| VTE 204 | Enterprise Creation & Development | 2 | C |

This course is designed to be the students’ second encounter with the ECSA Programme and business/enterprise creation is expected to form its focus of attention. At the end of this course, every student is expected to have conceived and registered a business enterprise or an organization to be used as the vehicle for the actualization of the dream product (idea) approved at the end of the first semester course GNS 203. The students are to be taken through: Definition and Conceptual Clarification of Entrepreneurship, The Characteristics of Entrepreneurship and Success Secrets, Theories and Psychology of Entrepreneurship, Definition of Business (the Enterprise, the Activity), Business: Its Characteristics and Objectives, Business Classification and Ownership Forms, The Scale of Business Operations and Location, The Theory of the Business, The Process of Establishing a Business and the Practical Registration of a Business Enterprise.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

.

|  |  |  |  |
| --- | --- | --- | --- |
| VTE 303 | Entrepreneurship Mentorship | 1 | C |

This is proposed to be a Mandatory 3 months’ vacation programme for the students to acquire some specific skills. Through this programme, the students are to be attached to some identified business enterprises/organizations. Through this programme, the students will get to see, first hand, a demonstration of most of the things taught in the GNS 203 and 204 classes and perhaps have the opportunity to practice some of them. The students are expected to spend the period of the long vacation preceding the session of this course learning a specific trade or skill for about 10 – 12 weeks. The report of this is submitted on resumption while the class activities would bring the students in contact with the various professionals for interaction.

|  |  |  |  |
| --- | --- | --- | --- |
| VTE 304 | Enterprise Resource Planning/Business Plan | 1 | C |

This course will collectively and practically introduce the concept of enterprise resource planning to the student. How to collectively plan the resources of the enterprise considering the limitations of the organization is the focus of this course.

**GET COURSES**

**Mathematics Courses**

|  |  |  |  |
| --- | --- | --- | --- |
| MAT 101 | Elementary Mathematics (Math I) | 3 | C |

Elementary set theory, subsets, union intersection complements, and Venn diagrams. Real numbers, rational and irrational Numbers mathematical induction, real sequences and. Series, theory of Quadratic equations, Binomial theory, complex number algebra of complex number the Argand complex diagram. De Moivre's theorem, nth roots of unity- Circular measure, trigonometric function of angles of any magnitude, addition and function formula.

|  |  |  |  |
| --- | --- | --- | --- |
| MAT 102 | Elementary Mathematics II | 3 | C |

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, scalar and multiplication of vectors, linear independence. Scalar and vectors products of two vectors differentiation and integration of vectors with respect to a scalar variable. Two dimensional coordinate geometry. Straight line, circles, parabola, ellipse, hyperbola. Tangents normal, Kinematics of a particle moving in a plane. Force, Momentum, laws of motion under gravity, projectiles, resisted vertical motion, elastic string, simple pendulum, impulse, impact of two smooth spheres and of a sphere on a smooth surface.

|  |  |  |  |
| --- | --- | --- | --- |
| MAT 103 | Elementary Differential & Integral Calculus | 3 | C |

Functions of a real variable, graphs, limit and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation, maxima and minima. Extreme curve stretching, Integration. Definite integrals, reduction formulae, application to areas, volumes (including approximate integration: “Trapezium and Simpson rule”.

|  |  |  |  |
| --- | --- | --- | --- |
| MAT 104 | Elementary Algebra &Trigonometry | 3 | C |

Mapping, bisection, composition, inverse mapping, binary operations, associativity, identity elements, invertible element, distributivity. Relations, fundamental theorem of equivalence relations. Trigonometric ratio, sums and products formulae. Multiple & Sub-multiple angles. Graphs of trigonometric functions, inverse circular functions. Solutions of triangles and trigonometric equations. Heights and distance in 2 and 3 dimensions. Geometrical equations of lines and planes and other applications. Geometrical equations of lines and planes and other applications. Angles between two lines. Taylor’s and Maclarin’s theorem. Simple examples.

**Physics Courses**

|  |  |  |  |
| --- | --- | --- | --- |
| PHY 101 | General Physics I | 4 | C |

**A: Mechanics and Properties of Matter**

Units and dimensions, scalars and vectors, particle kinematics, Newton's laws. Friction work. energy, center of mass, simple harmonic motion, rigid body dynamics, Kepler's laws, pressure in fluids, intermolecular force, Hooke's law, Young's modulus, fluid flow streamline, turbulence, stokes' law, surface tension.

**B: Heat Sound and Optics**

Temperature, thermometers, heat transfer, PVT surfaces, Kinetic theory first and second laws of the thermodynamics, transverse and longitudinal waves, standing waves, intensity, beats, Doppler effect electromagnetic spectrum, Huygen's Principle, images formed by a single surface, thin lines, aberrations, the eye, optical instruments, interference, single diffraction, Action grating polarization, Malus' law.

|  |  |  |  |
| --- | --- | --- | --- |
| PHY 102 | General Physics II | 4 | C |

**A: Atomic and Nuclear Physics**

Theory of atomic structure, Thompson, Rutherford and Bohr's theories, the Hydrogen atom. properties of the electron, C/M, C.R.O., Millikan's experiment, properties of the nucleus, natural radioactivity, wave particles, duality of light, X-rays, photoelectric, thermionic emission, diode value.

**B: Electricity and Magnetism**

Coulombs law, Gauss's theorem, capacitors, Ohm's law, Kirchhoff’s first and second laws, electrical energy, bridges, potentiometer, magnetic effect of current, electromagnetic induction, moving coil and ballistic galvanometers, multimeter, DC and AC motors and generators, hysteresis power in AC circuits, semiconductors, conductivity and mobility, rectification.

|  |  |  |  |
| --- | --- | --- | --- |
| PHY 103 | Introductory Physics I | 1 | C |

**A: Vibrations, Waves and Optics**

Periodic motion of an oscillators, velocity and acceleration of a sinusoidal of equation of motion of a simple harmonic oscillator, damped oscillators, forced oscillators, resonance, propagation of longitudinal and transverse vibrations. Wave behaviour, reflection of waves, stationery waves, propagation of straight and circular pulses, Fiber optics diffraction, refraction, dispersion, interference, coherence, polarization. Waves and sound, vibrations of air columns and strings, Doppler effect, waves and light, mirrors, lenses, formation of images. Concave and convex lenses, microscope, telescope, chromatic and spherical aberration and their reduction dispersion by prisms, relationship between colour and wave length, spectra.

**B: Electronics**

Vacuum tubes, electrode and pentode, application of valves, semiconductors, junction diodes, transistor application.

|  |  |  |  |
| --- | --- | --- | --- |
| PHY 104 | Experimental Physics II | 1 | C |

**A: General Physics Laboratory**

This introductory course emphasizes quantitative measurements; the treatment of experimental technologies will be employed. The experiment which studies of metres. The oscilloscope, mechanical system, electrical and mechanical resonant system, light, heat and viscosity.

**B:** **General Physics (Modern Physics)**

Special relativity, defect in Newtonian mechanics, the speed of light, the Lorentz transformation, transformation of velocities, experimental basis of quantum theory, black body radiation, electrons and quanta, Bohr's theory of atomic structure, De Broglie’s hypothesis, the uncertainty principle, Schrodinger's equation and its simple applications.

**Statistics Courses**

|  |  |  |  |
| --- | --- | --- | --- |
| STA 101 | Introduction to Probability | 2 | C |

Probability as a measure of uncertainty; sample points and events combination of events. Definitions and basic properties of probability Joint and conditional probabilities. Combinatorial analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| STA 102 | Introduction to Probability Distribution | 2 | C |

Random variables. Bernoulli trials. Binomial, Geometric, Poisson, Uniform and Normal distributions. Concepts of linear regression, correlation and association of attributes.

**Chemistry Courses**

|  |  |  |  |
| --- | --- | --- | --- |
| CHM 112 | General Inorganic Chemistry | 3 | C |

Periodic table (descriptions and classification of the elements) and periodic properties (atomic radius & ionic, ionization energy, electron affinity, metallic character); electronic configuration & atomic orbitals; chemical bonding – bond character, bond theory, hybridisation; intermolecular bonds; structures of solids; chemistry of selected representative elements; qualitative analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| CHM 122 | General Organic Chemistry | 2 | C |

Survey of history and development of organic chemistry; functional groups, classification of organic compounds and nomenclature – bicyclic, spiro etc; uniqueness of carbon – catenation, hybridisation; types of bonds and their properties; effect of hybridisation on bond properties – bond length, bond strength, bond energies, bond angles, reactivity; basic organic chemistry of saturated and unsaturated hydrocarbons – free radial substitution , addition reaction; hydrocarbons stereochemistry of hydrocarbons (conformation, cis-trans isomers); isolation and purification of organic compounds.

|  |  |  |  |
| --- | --- | --- | --- |
| CHM 131 | General Physical Chemistry | 3 | C |

Concept of atoms, atomic masses, atomic structure; atomic models (Dalton, Thompson, Rutherford, Niel Bohr, Sommerfied, wave models), modern electronic theory of atoms, periodicity of elements; mole concept, chemical equations and stoichiometry calculations; state of matter: gas, liquid, solid; energetics; first law of thermodynamics; chemical kinetics; chemical equilibria; electrochemistry.

|  |  |  |  |
| --- | --- | --- | --- |
| CHM 151 | Practical Chemistry I | 1 | C |

Measurement practices – mass, volume, temperature; quantitative analyses involving acid-base titrations, redox titrations, argentometric titration, complexometric titrations, gravimetric analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| CHM 152 | Practical Chemistry II | 1 | C |

Qualitative inorganic analysis for elements in group IA, IIA, IIIA, IVA, IB, IIB and IIIB; chemical analysis for functional groups – aldehyde, ketone, carboxylic, unsaturation, aromatics.

**General Engineering and Technology Courses**

|  |  |  |  |
| --- | --- | --- | --- |
| GET 201 | Applied Electricity I | 3 | C |

Fundamental concepts – Electric fields, charges, magnetic fields.  Current, B – H curves, Kirchoff’s laws superposition. Thevenin, Norton theorems, Reciprocity, RL, RC, RLC circuits.  DC, AC bridges, Resistance, capacitance, Inductance measurement, Transducers. Single phase circuits, complex J – notation, AC circuits, impendence, admittance, susceptance.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 202 | Applied Electricity II | 3 | C |

Basic machines – DC, synchronous alternators, transformers, equivalent circuits.  Three phase balanced circuits, PN junction diode, Thyristors, FETs, communications fundamentals, introduction of TV, Radio and Telephone systems.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 215 | Engineering Graphics I | 2 | C |

Fundamentals of Engineering Graphics: Introduction to Engineering graphics, Types of Engineering Drawings, Drawing equipment, Code of Practice for Engineering Drawing, Lines, Scales, Drawing sheets and Title Block, Procedure for Drafting, Lettering. Dimensioning and Tolerancing, Geometry: Introduction, Building geometry, Geometry techniques for building a straight line, Geometric construction and engineering curves, parabola, ellipse, parabola, and hyperbola .Techniques for drawing polygons and normal structures. Orthographic drawing: Concept of Projection, Types of Projections, Orthographic Projection, First angle & third angle Projection, Orthographic Projection of Points, Simple lines, simple planes.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 216 | Engineering Graphics II | 2 | C |

Conventional practices- on Isometric Drawing, Sectioning. Introduction to Computer Aided Drafting: Electronic drafting packages: principle and use in engineering design. Simulation packages: principle and use in engineering.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 233 | Engineering Technology | 2 | C |

Workshop Safety, Bench Work and Marking, Engineering Material and their Properties: Classification of Engineering Materials, Physical Properties of Metals, Mechanical Properties of Metals. Heat Engines (Internal and external combustion engines), Workshop Processes: welding processes, Processes using pressure amd heat, Temporary fasteners and Permanent fasteners, Introduction to Hot and Cold Working Processes,Introduction to Workshop Machines: lathe machine, drilling machine, shaping machine grinding machine.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 241 | Fundamentals of Fluid Mechanics | 3 | C |

Characteristics of a Fluid, Fluid Statics, Conservation Principles, Fluid Dynamics: uniform flow, steady flow, flow rate, continuity, Bernoulli equation, momentum equation; Fundamentals of Flow, Flow in Pipes and Ducts, Dimensional Analysis and Law of Similarity, Principle of construction and operation of selected hydraulic machinery, Hydropower System.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 242 | Fundamentals of Thermodynamics | 3 | C |

Introduction and Basic Concepts, First Law of Thermodynamics, Application of First Law of Thermodynamics: Non-Flow Processes, Flow Processes; Second Law of Thermodynamics, Thermodynamic properties: Tables and Graphs, Application NFEE to particular Fluid with Numerical Examples, Application of SFEE to particular Fluid with Numerical Examples.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 251 | Engineering Mechanics I | 2 | C |

General Principles in basic mechanics, Force vectors, Equilibrium of a particle, Force system Resultants, Equilibrium of a rigid body, Structural Analysis, Internal Forces, Friction, Center of gravity and centroid, Moments of Inertia, Virtual work.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 252 | Engineering Mechanics II | 3 | C |

Kinematics of a particle, Kinetics of a particle: force & acceleration, work & energy, impulse and momentum, Planar kinematics of a rigid body; Planar kinetics of a rigid body: force & acceleration, work & energy, impulse & momentum; Three-Dimensional kinematics of a rigid body; Three- Dimensional kinetics of a rigid body; vibrations.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 261 | Computer Programming I | 1 | C |

Identification, functions, applications, and use of PC parts and peripheral devices. Safety precautions and preventive maintenance of PC. Filing system: Word processing applications and use. Internet: available services, principle of operation, applications, demonstrations. Spreadsheet: applications, and how to use. Database Management package: applications, demonstrations. Report Presentation Software Packages: applications, demonstrations, and use.  Mini-project to test proficiency in use of these software packages.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 262 | Computer Programming II | 2 | C |

Program design using pseudo-code/flowchart. Extensive examples and exercises in solving engineering problems using pseudo-code/flowchart.  Computer programming using structure BASIC such as QBASIC: symbols, keywords, identifiers, data types, operators, statements, flow of control, arrays, and functions. Extensive examples and exercises in solving engineering problems using QBASIC. Use of Visual programming such as Visual BASIC in solving engineering problems.

15h (Teaching & Demonstrations), 30hrs. (Practical), C, 15h (T), 45h (P)

|  |  |  |  |
| --- | --- | --- | --- |
| GET 263 | Engineering Mathematics I | 3 | C |

Limit and Continuity, Review of differential Calculus, Matrices and Determinant, Introduction to linear First Order Differential Equation, Partial and Total derivative of composite Function, Vector Algebra, Vector Calculus and derivative.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 264 | Engineering Mathematics II | 3 | C |

Vectorial Calculus: review of vectors, differentiation of vectors, Integration of vectors, Second Order Differential Equations, Fourier Series, Laplace Transformation.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 272 | Engineering materials | 2 | C |

Material Properties. Introduction to engineering materials and the properties. The four classes of engineering materials. Mechanical behaviours’, stress – stain behaviour, engineering stress and strain, elastic limit, Young’s modulus, Poisson’s ratio, elastic – plastics behaviour, strength, true stress and strain, compressive behaviour, hardness toughness (fracture behaviour, brittle – ductile transition), creep deformation and fatigue strength (S-N approach, fatigue limit, strength and life), non-destructive testing. An introduction to the Cambridge Engineering Selector (CES) package for material properties and basic material selection.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 283 | General Engineering Lab. Course I | 2 | C |

All courses in 1st semester share the laboratory schedules to suit; sometimes alternate weeks.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 284 | GET labs. Course II | 2 | C |

All courses in 2nd semester share the laboratory schedules to suit; sometimes alternate weeks.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 302 | Engineering Economics | 3 | C |

The nature and scope of economics. Basics concepts of engineering economy. Interest formulae. Discounted cash flow, present worth, equivalent annual growth and rate of return comparisons. Minimum acceptable rate of return. Judging attractiveness of proposed investments.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 361 | Engineering Mathematics III (Advanced Mathematics) | 3 | C |

Fourier series: periodic functions, trigonometric series. Fourier coefficients, Parsevals theorem, Functions of arbitrary period, even and odd functions. Half range expansion. Complex form of Fourier series.Transforms: Derivation of transforms and inverses (Fourier and Laplace).Applications of these transforms in boundary and initial value problems. Z-transforms.

Partial Differential Equations: Basic concepts of partial differential equation. Classification of 2nd order linear partial differential equation into basic types.The principle of superposition.Modeling of physical systems leading to partial differential equations.The wave, diffusion and Poisson’s equations.Boundary and initial-value problems.D’ Alembert’s solution for the wave equation.Solution by method of separation of variables.Biharmonic equation.

Multiple integrals: iterated integrals over elementary regions. Change of variables, jacobians. Differentiation of integrals involving a parameter, Leibnitz’s rule. Vector algebra: Vector field, gradient and directional derivative, divergence, curl. Line and surface integrals, Stoke’s theorem.Volume integrals, divergence theorem.Orthogonal transformations, scale factors, basis vectors. Cylindrical and spherical polar coordinate systems, gradient divergence and curl in these systems.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 362 | Engineering Mathematics IV | 3 | C |

Numerical Methods: Finite difference. Interpolation.Numerical differentiation and integration.Numerical solution of ordinary differential equations, Trapezoidal, Simpson, RungeKutta methods.Newton Raphson method for root of equations.System of simultaneous linear equations.Linear simultaneous equations, Gaussian elimination, GaussSeidel iterative method, Jacobai Method, evaluation of determinant and inverse matrix.Eigensystem analysis: system stability, eigenvalue sensitivity, stability of Gauss-Seidel solution, amplitude and time scaling for model studies. Use of numerical analysis software packages to solve simple engineering problems. Introduction to linear programming (or linear optimization) –Graphical and Simplex methods.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 373 | Engineer in the Society | 1 | C |

Philosophy of Science and engineering; History of Engineering and Technology; The Engineering profession; Engineering Literacy; Professional bodies and Engineering Societies; Engineers Code of conducts and Ethics; Engineering and Nation building; Economy, Politics, Business; Safety in Engineering and Introduction in Risk Analysis; Indigenous Technology, (Building construction, Bridges, Cloth weaving, Pot making, etc.); Invited Lecturers from professionals. 15h (T); C.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 376 | Engineering Communication | 3 | C |

Professional use of English Language for letters, specification descriptions, presentation of charts, graphs, tables, writing of proposals in reports, Case studies of major professional presentation of reports and proposals.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 463 | Engineering Statistics | 2 | C |

Descriptive Statistics, frequency distribution, populations and sample, central tendency, variance, data sampling, mean, median, mode, mean deviation, percentiles etc. Probability. Binomial, Poisson, hyper geometric, normal distributions, etc. Statistical inference intervals, tests hypothesis and significance. Regression and correlation. 30h (T); C.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 501 | Engineering Management | 2 | C |

Essence of Management task. Patterns of leadership. Creating a viable organization. Productivity and motivation, organizing task. The span of control and the delegation of authority. Organizational theory and concepts. Industrial safety. Engineering business- types, structure, and functions of organisations. Techniques in engineering management. Production management – product design and development, planning and control. Work scheduling.

|  |  |  |  |
| --- | --- | --- | --- |
| GET 502 | Engineering Law | 2 | C |

Government policies and the firm. Ethics and conduct in Engineering Application of business law to engineering. Industrial relations. Introduction and Sources of Law. Formation of Contracts. Liabilities in torts: assaults, negligence, strict liability. Professional role and liabilities of engineers. Contract of employment: independent contractors, workmen compensation. Property law: partnerships. Intellectual property: copyright trade mark, design, patent. Registration and Incorporation of companies and effects. Case studies relating to professionals. Arbitration. 30h (T); C. 45h (T); C.

**DEPARTMENTAL (ECE) COURSES DESCRIPTION**

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 312 | Measurement and Instrumentation | 2 | C |

Fundamental concepts and definitions in metrology. Theory of errors; Indicating instruments. Moving coil and moving iron devices. Current, voltage, energy (kWh) and P.F instruments. Dynamometer. Frequency measurement. Digital methods for measurement of physical quantities. Bridges analog electronic measuring instruments. Cathode Ray Oscilloscope. Transducer. Gauges. Curve tracer and recorders. Measurement of temperature. Data logger and data acquisition system.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 315 | Electric Circuit Theory I | 3 | C |

Circuit elements, sources, circuit theorems, applications. Network response to Steps, ramp, impulse, Network functions, response to exponential, sinusoidal sources. Laplace, transform, pole- zero analysis, network synthesis, resonance, two-point analysis, ladder network, Star-Delta transformation, T, Pi Network.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 316 | Electric Circuit Theory II | 3 | C |

Non-linear circuit analysis. Network functions, filters, Active network synthesis and analysis.

Applications of computers in the analysis of linear and non-linear circuits. Gyrators, Negative Impedance Converters (NICs), Frequency-dependent negative resistors.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 321 | Electronic Circuits 1 | 3 | C |

Introduction to physical electronics. Semiconductor diodes, Zener diode, light emitting diode, Schottky diode, diode arrays. Diode Circuits and applications – rectification, waves shaping, regulators and voltage multipliers. Bipolar Junction Transistor – Introduction, construction, configuration, DC biasing, modeling and small signal analysis. Field Effect Transistor – Introduction, construction, configuration, DC biasing, modeling and small signal analysis. Audio amplifiers and compound amplifier. Power amplifier - Class A, AB, B, C, D. Tuned amplifier. Basic digital electronics – Introduction, logic operators and gates, Boolean expression and algebra, simplification of Boolean (logic) expression. Analysis, design of combinational circuits.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 322 | Electronic Circuits II | 3 | C |

Operational amplifiers and applications. Feedback amplifiers. Oscillators. Pulse circuits and sequential circuit. Flip flops and application, counters and registers. Logic families – DRL, RTL, DTL, TTL, ECL, P-MOS, N-MOS, CMOS, LSI, VLSI digital systems design. Memory circuits.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 331 | Electromagnetic Fields and Waves **I** | 3 | C |

Electrostatics, electric field, potential, Coulomb’s Gauss law, Laplace, Poison equations, electric displacement, dipoles, boundary conditions, uniqueness theorem, image method. Magneto-static induction, flux, field strength, vector potential, Ampere’s law, Magnetic force, moving change, electromagnetic induction, Maxwell’s equations, free space wave propagation.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 341 | Data Communication and Computer Network | 3 | C |

Introduction to Data communications. LAN topology, access methods, signaling methods. WAN systems. Protocols: Introduction to network protocol. Seven Layer ISO-OSI standard protocols and network architecture. Peer-to-peer, Client Server. Client-Server Requirements. Information Network Software. Features and benefits of major recovery mechanisms. Network Operating Systems. Internet protocol, IPv4, IPv6. Internet programming, Intranet. System administration and security issues.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 342 | Applied Computer Programming | 2 | C |

Software development life cycle. Top-down design. Program design using pseudo-code, flowchart. Flowchart ANSI symbols and usage. Programming using a structured language such as C: Symbols, keywords, identifiers, data types, operators, various statements, operator precedence, type conversion, conditional and control structures, array, function, recursive functions parameter passing, pointers, structure, union. File Handling. Software development in C in MS Windows, UNIX/LINUX environments.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 361 | Electrical Machines I | 3 | C |

Energy conversion concepts, machines, generators, motors, shunt and series characteristics. Design, construction, characteristics of DC machines, Transformer, equivalent circuits, design, construction, characteristics. Open/Short circuit, polarity tests. Regulation, Auto, three-phase transformers, Connections.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 362 | Electrical Machines II | 3 | C |

**Induction Machines:** Introduction, rotating magnetic field, cosine wave, second sine wave, amplitude vary, third sine wave, amplitude to change, sum up, polar plot, waveforms of all three cosines, circular trajectory, principles of torque production, construction, equivalent circuit, determination of circuit parameters, deducing the machine performance, speed control of induction machines, harmonics in induction machines.

**Synchronous Machines:** Introduction, synchronous machine armature windings, synchronous generator operation, parallel operation of two generators, interconnected synchronous generators, synchronous motors.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 381 | Laboratory Course I | 1 | C |

Laboratory investigations and report submission for selected experiments and prescribed project drawn from first semester courses.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 382 | Laboratory Course II | 1 | C |

Laboratory investigations and report submission for selected experiments and prescribed project drawn from second semester courses.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 392 | Student Industrial Work Experience I | 2 | C |

For the SIWESI period, all 300Level students is expected to undergo practical training on the job with engineering industry as approved by SIWES coordinator based on its relevance to the student’s major for a minimum of 10 weeks starting immediately at the end of first semester examinations at 300 level. A training programme will be drawn by the department in collaboration with the industry for each student, each student is expected to record his/her daily activities in a prescribed logbook and duly signed by industrial based supervisor. At the end of the programme, a written report is to be submitted to the department and each student to present a seminar on his/her industrial (hands-on) experience gained during the training.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 421 | Digital Electronics | 3 | C |

Digital and Analog systems: Introduction to Digital and Analog quantities, binary digits, logic levels and digital wave form, introduction to basic logic operations, digital integrated circuits, advantages of digital systems over analog systems. Number Systems: operations and codes, decimal and binary numbers, 1’s and 2’s complements, Hexadecimal and Octal numbers, Binary coded decimal (BCD) and digital codes. Logic Gates: The inverters, AND gate, OR gate, NAND gates, NOR gates, exclusive-OR gate, exclusive-NOR gate, example of IC gates. Boolean algebra and Logic Simplifications: laws of Boolean algebra, riles of Boolean algebra, De-Morgan’s theorems, logic simplification using Boolean’s laws, rules and De-Morgan theorem, simplification of logic expression using Karnaugh map Combinational Logic; Combinational Logic; Clocks and Timing Circuits. Interfacing: Interfacing between different types of logic gates [TTL, MOS, ECL, etc.]. Flip-Flop: latch, NAND gate latch, NOR gate latch, Signal Converters: Analog – Digital [A/D] and Digital – Analog [D/A] converters; Timer IC operations and application; Digital readouts: 7 - segment display and display drivers, multiplexed and un-multiplexed displays, keyboard encoders, PLD, FPLD, PLA, Introduction to Microcomputer and Microprocessors.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 431 | Electromagnetic Fields and Waves II | 2 | C |

Propagation of electromagnetic waves in free space and in material media. Dielectric, conductors and ionized media. Transmission line theory including wave-guides and resonators, the Smith Chart. Radiating elements and antenna theory.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 441 | Control Engineering I | 3 | C |

Introduction to control systems - feedback concept and advantages, system classification, structures. Control systems components – mechanical, electronic, hydraulic, thermal, position control, servomechanism and regulators. Mathematical modeling of control systems, System transfer functions, signal flow graphs, block diagram reduction, stability, Routh-Hurwitz criteria. Transient and steady state analysis of control systems. Compensation techniques. Series/parallel feedback Controllers. State space modeling and analysis of control systems.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 445 | Assembly Language Programming | 2 | C |

Introduction: Language level of abstraction and effect on machine, characteristics of machine code, advantages, justifications of machine code programming, instruction set and dependency on underlying processor. Intel 8086 microprocessor assembly language programming: Programming model as resources available to programmer, addressing modes, instruction format, instruction set- arithmetic, logical, string, branching, program control, machine control, input/output , etc.; assembler directives, hand-assembling, additional 80x86/Pentium instructions. Modular programming. Interrupt and service routine. Interfacing of assembly language to C. Intel 80x87 floating point programming. Introduction to MMX and SSE programming. Motorola 680x0 assembly language programming. Extensive practical engineering problems solving in assembly language using MASM for Intel, and cross-assembler for Motorola.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 451 | Principle of Communication Engineering | 3 | C |

Principles of Communications**:** Types of transmission. Brief historical development on communications. Block diagram of a communication system. The frequency spectrum. Signals and vectors, orthogonal functions, Fourier series, Fourier integral, signal spectrum, convolution, power and energy, correlation. Reasons for modulation. Types of modulation. Comparison of AM systems. Vestigial sideband. Frequency mixing. Frequency modulation systems: frequency deviation, modulation index, significant sideband criteria, bandwidth of a sinusoidally modulated FM signal, power of an FM signal, narrowband FM, direct and indirect FM generation, various methods of FM demodulation, discriminator, phase-lock loop; limiter, pre-emphasis and de-emphasis. Noise waveforms and characteristics. Effect of noise on AM and FM systems. Antenna principle and design. Block diagram of a super-heterodyne AM radio receiver, broadcast band and specification. TV broadcast band and specification. Signal format, transmitter and receiver block diagrams of Black and White TV, and Color TV.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 471 | Electrical Power Principles | 3 | C |

Types of power station, operation, auxiliaries, economics of operation – stations, substations power supply economics, tariffs, Power factor correction. Poly-phase theory. DC, AC power distribution, network calculations. Overhead line conductors. Corona effect, voltage control, circuit breakers, load forecast, sitting of generating plants.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 481 | Laboratory Course and Mini Project III | 1 | C |

Laboratory experiments for Electronics control communication, Power and assembly language programming.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 492 | Student Industrial Work Experience | 6 | C |

For the SIWES period, all 400Level students is expected to undergo practical training on the job with engineering industry as approved by SIWES coordinator based on its relevance to the student’s major for a minimum of 28weeks starting immediately at the end of first semester examinations at 400 level. A training programme will be drawn by the department in collaboration with the industry for each student, each student is expected to record his/her daily activities in a prescribed logbook and duly signed by industrial based supervisor. At the end of the programme, a written report is to be submitted to the department and each student to present a seminar on his/her industrial (hands-on) experience gained during the training.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 503 | Design of Electrical and ICT Services | 2 | C |

Basic electrical installation. Distribution system. Regulation-IEE, NSE, Nigeria standard. Illumination. Cables-types, ratings, wiring systems, earth protection. Auxiliary electrical system-Fire alarm, telephone, elevator circuit. Design of electrical installation-Domestic, industrial, commercial, air-conditioning. Telecommunication Design & Installation: Telephone, PABX, cables, cablings, trucking, calculations, etc. Computer Networking: Design, Calculations, topology, cables, cabling, etc. Satellite and VSAT installation. Surge and lighting protections. Earthing: earth resistivity measurement, surge and lighting equipment selection and installation. Contract proposal and document preparation. Costing and preparation of BEME. Basic Law of Contract. Commissioning. Environmental Impact Assessment (EIA).

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 504 | Reliability and Maintainability of Electrical System | 3 | C |

Introduction to reliability, maintainability, and metrics. Application to computer hardware system, communication equipment, power systems, electronic components. Basic maintenance types. Fault troubleshooting techniques. Quality of Service (QoS) and time of availability of data communication. Quality control techniques. Design for higher reliability, fault tolerance. Software Reliability: specification, and metrics. Programming for reliability, software safety and hazard analysis. Comparison of hardware and software reliability. Software Quality and Assurance. Software quality metrics. Ensuring Quality and Reliability: verification and validation, measurement tracking and feedback mechanism, total quality management, risk management.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 523 | Power Electronics | 2 | C |

Overview of Power Semiconductor Devices: Power Diodes, Thyristors, Power MOSFET, G.T.O., IGBT, IGCT, Field Controlled Switches (ST and STH), Comparison of Semicoductor Switches, Desired Characteristics in Controllable Switches, Drive and Snubber Circuits, Linear Commutating Diode. Converters: Rectifiers (AC –DC) -Uncontrolled, Half-Controlled and Full-Controlled Rectifiers, Single-Phase Diode Bridge Rectifiers, Three-Phase Rectifiers, AC Voltage Regulators. Smoothing techniques. Voltage and current regulation, regulator circuits, the thyristor or SCR and its applications, timing circuits, motor speed control, power translator and integrated circuits, welding and heating.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 524 | Industrial Electronics | 2 | E |

Programmable Logic Controller: Introduction to PLC, PLC instructions, Timing and Counting, Closed-loop and open-loop control using PLC. Mechanical and Solid-State Switches: Mechanical Switches, Electromechanical Devices, Solid-State Switches: BJT MOSFET, UJT, SCR, TRIAC, Application examples. Transducers and Signal Conditioning Circuitry: Thermisters and Sensistors, Magnetic Proximity Sensors, Capacitive and Ultrasonic Level-Sensing Transducers, Pressure and Flow-Sensing Transducers, Force-Sensing Transducers, Signal Conditioning Circuitry for the above devices. Industrial Optoelectronic Devices: Industrial Light Sources, Photoconductive Cells, Photodiodes, Phototransistors, Optoisolators, Optocouplers, Interrupter Modules, Industrial Applications of light sensors, Bar Code and Bar Code Readers. Motors and Motor Control Circuitry: Review of ac and dc motors, Basic dc Motor Control Circuitry, Synchros and Resolvers, Brushless dc Servomotors, Stepper Motors, Motor Drive Circuitry.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 531 | Introduction to Robotic and Automation | 2 | E |

Definition and Applications of Robot, Technology and history of development of robotics. Components and Structure of Robots; Symbolic Representation, Degrees of Freedom and Workspace, Geometry, Common Kinematic Arrangements. Rigid motions and Homogeneous Transformations: Rotational Transformations and Homogeneous Transformations, Forward and Inverse Kinematics equation: the Denavit-hartenberg Convention, Workspace analysis and trajectory planning. Differential motion and statics. Manipulator dynamics. Wrists and End-Effectors tooling. Automation sensors. Robot vision. Work-cell support systems. Robot and system integration. Safety. Human interface. Robot control system. Circuit and system configuration. Task oriented control. Robot control programming. Fuzzy logic and AI based robot control. Fundamentals of automation. Strategies and economic consideration. Integration of systems. Impact to the production factory. Evaluation of conventional processes. Analysis of automated flow lines. Assembly system and line balancing. Automated assembly systems. Numerical control and adaptive control. Robot applications.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 532 | Modeling and Simulation | 2 | C |

Introduction to modeling and simulation: definition of modelling, definition of simulation, what brought about simulation, types of modeling, advantages of modelling and simulation, modelling procedure. Simulation Programming: types of simulation software The Essentials of Probability: definition of probability, types of probability, important terms in probability, rules of probability. Monte Carlo Techniques/ method: Definition of Monte Carlo method, optimization problem, numerical integration problem, general draw from probability distribution, steps to follow when using Monte Carlo techniques for simulation, areas of application of Monte Carlo Technique. Discrete Event Simulation (DES): Definition of discrete event (DE), areas of application of discrete event simulation, characteristics of an effective discrete event simulation, basic components of DES. Stochastic Models: Least Squares, Markov Models with Applications to Data Networks, Queuing Models. Use of software package such as: Matlab, Spics, Multism etc, in circuit and mode simulation.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 541 | Microprocessor and Embedded System Design | 3 | C |

Introduction to embedded system, components, characteristics and applications. Intel 8051/8031 Micro-controller: Features of the 8051/8031 family, block diagram and definitions of the pin of the 8051, I/O port structure, memory organization: general purpose RAM, bit addressable RAM, register bank, special function registers, external memory, memory space mapping and decoding, bus control signals timing, a typical 8051 micro-controller based system. Instruction Set and Assembly Language Programming: Addressing modes, the 8051 instruction set and typical examples, assembler operation, assembly language format, assembler directives, operation of assemblers and linkers, programming examples. On-chip Peripheral Devices: I/O ports, operations and uses of port 0, port 1, port 2, port 3, timers: their operations, programming, and applications, serial port: operations and programming, typical applications, serial port interrupt. Interfacing to external memory, keypad, seven-segment LED display, ADC and DAC chips, and input / output port expansion, description and uses of hardware development tools. MOTOROLA M6811 Micro-controller: Features of the M6811 family, block diagram and definitions of the pin of the M6811, I/O port structure, memory organisation: general purpose RAM, bit addressable RAM, register bank, special function registers, external memory, memory space mapping and decoding, bus control signals timing. Instruction Set and Assembly Language Programming. On-chip peripheral devices and I/O interfacing. Introduction to PIC microcontroller: general architecture, applications and selection of microcontroller, advantages, low-end, and high performance PIC. Specific PIC microcontrollers: Features, architecture, block diagram, pin configuration, on-chip memory, and peripheral. Instruction set and Assembly language programming. Serial I/O interfacing: I2C, and SPI interfacing and programming. Memory interfacing: external memory interfacing, EEPROM and Flash memory interfacing. Design exercises using development system.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 542 | Digital System Design & VHDL Programming | 3 | C |

Finite State Machine. Sequential circuits design. Structured Design: Design constructs, Design Levels, Geometry-based interchange formats, Computer aided electronic system design tools, Schematic circuit capture, Hardware description languages, Design process. Introduction to VHDL: language, design. Concurrent VHDL, Sequential VHDL, Advanced features of VHDL. Structural level modeling, Register-Transfer level modeling, FSM with data path level modeling, and Algorithmic level modeling. Introduction of ASIC. FPGA Design. Paradigm, FPGA synthesis, FPGA/CPLD Architectures. VHDL synthesis, optimization and mapping, constraints, technology library, delay calculation, synthesis tool, synthesis directives. Computer-aided design of logic circuits.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 545 | Control Engineering II | 2 | C |

Frequency analysis, Nyquist plots, criterion, relative stability, M – and N – circles, Inverse Nyquist plots. Bode diagrams, determination of transfer function from asymptotic plot, Nichols chart. Root locus plots. The 3-term (PID) controllers. Series and parallel compensation design. Design using Bode, Nicholas and Root locus methods. Computer Aided Design and Analysis of Control System. Introduction to Nonlinear control system: Types of nonlinearities, Describing function, Phase plane, limit cycle, closed loop response and stability. Case study design and analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 546 | Modern Control Engineering | 3 | C |

Digital control; concept of sampling, Z – transform, inverse zero-order- hold, transfer function of sampled data system, stability analysis. Finite word length effect. Digital 3-term PID design. State space: State variables of dynamic system, formulation of state vector differential equation, solution state equation, transition matrix, eigenvalues and eigenvectors. System response and stability. Introduction to Neural Network. Introduction to Fuzzy control system. Introduction to mechatronics and robotics.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 551 | Satellite Communications | 3 | C |

Satellite communication: Types (LEO, GEO, etc.), orbit, frequency bands, applications and service. Antennas: types, gain, pointing loss, G/T, EIRP, high power amplifiers, low noise amplifier, BUC/LNB: conversion process, polarization hopping, redundancy configuration, earth station monitoring and control. Basic link analysis, attenuation, sources of interface, carrier to noise and interface ratio, system availability, frequency reuse, ink budget, link design. Multiple access technique. VSAT network: technology, network configurations, multi-access and networking, network error control, polling VSAT networks.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 552 | Digital Signal Processing | 3 | C |

Overview of signal, systems, signal processing; concepts of discrete- time signal processing and systems necessary for the design and analysis of advance signal processing technology. Types and selection of ADC/DAC, sampling theorem, aliasing, quantization, noise and coding. Analysis and application of discrete-tie signals and systems in transform z-domain: z-transform, properties, transfer stability, causality and difference equations. Discrete Fourier analysis and FFT. Digital time signals and systems, DTFT and IDTFT. Digital filters: definitions and types, structure and design, FIR and IIR filters. Software implementation of DSP algorithms. DSP microprocessor: architecture, fixed point and floating point DSP; signal segmentation effect, DSP chips. Practical application of DSP in audio and video.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 553 | Mobile and Wireless Communications | 3 | C |

Evolution and examples of mobile radio communications. Basic cellular system, frequency reuse, roaming, hand-off strategies, co-channel interference, traffic and grade of service. System capacity and improvement. Propagation path loss, multipath propagation problem, Raieigh fading, Rician distribution, Doppler effect. Field strength prediction modes. Standards and overview of analogue and digital cellular system: AMPS, TACTS, GSM, CT2, PCN, DECT, PHS. Frequency management and channel assignment. GSM: architecture, elements and standard interfaces, FDMA/TDMA structure. Third generation wireless standards. Paging and SMS service technologies. Call processing. Signaling, roaming and mobility management, route optimization. Wireless communication system design, Radio Channel Properties: Path Loss, Fading, Doppler etc., Cellular Systems: Frequency reuse, interference, hierarchical cell structures; Radio/Antennae types, Access Methods: FDMA, TDMA, CDMA, OFDM, Random access and packet transmission System Overviews, e.g. GSM, WCDMA and WLAN.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 554 | Optical Fibre communication system | 2 | E |

The optical fibre description, optical fibre principles, fibre types, optical fibre performance, fiber optics source and detectors, standard fibre optics systems, fibre optics switching and multiplexing and fiber optic testing.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 555 | Digital Communication Principles | 2 | E |

Extraction of digital signal from noise. Pulse shaping. Optimum reception. Baseband analysis. Inter-symbol interference (ISI). Matched filtering. Equalizers. ASK, FSK, GPSK, DPSK with noise, phase referencing and timing. Correction coding. Decoding

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 556 | Broadcasting and Internet Technology | 3 | C |

Elements of broadcasting system. Studio: design, acoustic and equipment. Broadcasting regulations. Frequency spectrum: allocation, assignment and licensing. Regulatory bodies. Design configuration, and services of CATV, MATV, MMDS systems. Multipath problems. Polarization, field strength, and footprint. Transmitter power rating, beamwidth, interference and minimum separation. Frequency spectrum management of digital and analogue broadcasting. Antenna design and installation for radio, television, and satellite. Antenna support: mast, tower, high altitude design and application. Digital Audio Broadcasting. Analog television standards: Digital television standards: MPEG, DVB, channel coding techniques. HDTV. Digital television/ monitor set: LCD, and plasma technology. Internet Technology: The internet, definition and services. Internet architecture, OSI layer, TCP/IP, internet addressing, IPv4, Pv6. Internet broadcasting: principles, components, standard, and applications.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 562 | Electric Energy Conversion and Storage | 2 | C |

Electromechanical energy conversion, source of motive power. Waste heat recovery. Solar energy and other sources of renewable energy. Wind, geothermal, pumps energy storage, primary and secondary cells, car and heavy vehicle batteries. Testing, fault diagnosis, repairs. Effect of environmental factors on battery life.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 563 | Electrical Machine Design | 3 | C |

Principles of AC and DC machine design: Magnetic Materials for Electric Machines; Stator Laminations & Core Design Studies; Stator Insulation System vs. Voltage & Temperature. Phase Induction Machine Design Strategy; Equivalent Circuit, Measurements and Torque vs. Speed Plots; Rotor Design for Asynchronous Induction Machines; PM Synchronous Generator Design Principles; Thermal Design Considerations for Electric Machines; Electric Machine Cooling Strategies; Mechanical Design Issues for Electrical Machines; Manufacturing Practices of Electrical Machines. Design of transformer.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 564 | Advance Electrical Machine | 3 | C |

Transient and steady analysis of poly-phase induction motors, equivalent circuits, characteristics and speed control. Synchronous machine: steady state analysis, saliency and d-q axis analysis, Matrices equations. Synchronous machines transients: Sudden 3-phase short circuit, transformation to d axis and q axis, operational circuit impedance and time constant, model for transient analysis. Synchronous phenomena and sustained oscillators in synchronous machines. Induction machine dynamics and transients: performance during both sudden changes in load and 3-phase fault, models for dynamic analysis, effect of rotor resistance.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 573 | Electric Power System Engineering | 3 | C |

Representation of power system; equation and analysis, load flow studies. Gauss-seidel and Newton-Ralphson iteration methods. Load forecasting, economic operation of power, voltage and frequency control of power system. Symmetrical components, symmetrical and unsymmetrical faults, stability studies, steady and transient stability. Switch gear and circuit breaker. Power system protection, principles of fault detection, discrimination and clearance. Various types of relays used in power systems. Over –voltage and insulation coordination. Transient, lighting. Switching. Breakdown mechanisms in solids, liquid and gaseous media. High voltage busing; terms in HV technology. Switch gear and circuit breaker.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 575 | Power System Communication and Control | 2 | E |

Review of transmission line theory, high frequency communication on power lines. Carrier systems and power line carrier applications. Multiplexing. Telemetering, signal processing and data transmission.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 576 | Power System Control and Stability | 3 | C |

Overview of power system control and stability: Basic requirements of a Reliable Electrical Power Service, Definition, and Classification of Power System Stability etc. The Elementary Mathematical Model - Swing Equation, Park’s Transformation. System Response to Small Disturbances - Unregulated Synchronous Generator and regulated Synchronous Generator. Power System Control: Automatic Generation Control (AGC), Real power and Frequency control, Voltage and Reactive power control; System stability and analysis; automatic voltage regulators;regulating transformers; systems faults analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 578 | Computer Application in Power Systems | 2 | E |

Revision of linear algebra and numerical methods. Iterative method. Newton-Raphson methods. Gauss elimination method, Gauss-Siedel method. Euler method, Runge-Kutta 4th order method. Node admittance matrix. Load flow analysis. State estimation. Load forecasting technique. Time series, Von Karman filter. MATLAB applications in power system.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 591 | Electrical and Computer Engineering Project I | 3 | C |

Original individual student project related to a prescribed electrical engineering problem involving literature review, identification, definition and formulation of the problem, theoretical investigations, modelling simulation, analysis and design.

|  |  |  |  |
| --- | --- | --- | --- |
| ECE 592 | Electrical and Computer Engineering. Project II | 3 | C |

Second phase of investigations involving the implementation of the designed model, debugging, calibration, testing, data collection and analysis, and presentation of a comprehensive written report of the investigations.

**MINIMUM GRADUATION REQUIREMENTS**

1. **University Requirements: 19 credits**

Every Undergraduate student of Electrical and Electronic Engineering Department, Kwara State University must take and pass the entire 9 credit units of General Studies Courses and four numbers of the 0 credit units of Entrepreneurship Courses (VTE) of the Enterprise Creation and Skill Acquisition (ECSA) Programme approved by the University Senate which are enumerated as follow:

**General Studies Courses (GNS)**

|  |  |  |
| --- | --- | --- |
| Course Code | Course Title | Units |
| GNS101 | Use of English I | 2 |
| GNS102 | Use of English II | 2 |
| GNS108 | Use of Library, Study skills and ICT | 2 |
| GNS206 | Introduction to Entrepreneurship | 2 |
| GNS307 | Politics and Inter-Governmental Relations | 1 |
| TOTAL | | **9** |

**Enterprise Creation and Skill Acquisition (ECSA) Courses**

|  |  |  |  |
| --- | --- | --- | --- |
| Course Code | | Course Title | Units |
| VTE203 | Innovation & Product Development | | 0 |
| VTE204 | Enterprise creation & Development | | 0 |
| VTE303 | Entrepreneurship Mentorship | | 0 |
| VTE304 | Enterprise Resource Planning/Business Plan | | 0 |
| TOTAL | | | **0** |

1. **GET courses: 57 credits**

In addition, a student graduates when he/she has passed all the core courses prescribed by the Faculty of Engineering and Technology dubbed General Engineering and Technology courses (GET) totaling 57 credits.

1. **Departmental courses: See departments for required credits**

In addition to the GET courses, a student must pass the required credits prescribed by the Departments of Electrical and Computer Engineering to graduate. These include all core courses and optional electives.

|  |  |  |
| --- | --- | --- |
| **Academic year** | **Minimum credits required** | **Cumulative minimum credits** |
| **300 level** | 30 | 30 |
| **400 level** | 25 | 55 |
| **500 level** | 33 | **88** |

## PROSPECT FOR GRADUATE

Graduates can work as an engineer in the under listed fields; responsible for research, design, construction, maintenance, management and consultancy services.

Generation Station; Transmission Station; Distribution Network Design and construction; Machine design and Controls; TV and Radio Broadcasting Station; Mobile telecommunication Service Provider; Internet Service Provider and Network connect Centre; Instrumentation and Control Engineer; Research and Development; Provision of Electrical and Telecommunication Services in Buildings; Design and Construction of Electronic and Utility Gadgets; Medical Instrumentation and Control; Image Processing; Speech Processing; Oil and Gas; Regulatory and Enforcement Agency; Defense; Aviation and many more.