

Student Handbook & Information Guide



**DEPARTMENT OF ELECTRICAL/ELECTRONIC
ENGINEERING**
FEDERAL UNIVERSITY OF TECHNOLOGY
P.M.B. 1526, OWERRI, IMO STATE, NIGERIA



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Student Handbook & Information Guide
Department of Electrical/Electronic Engineering, FUTO



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Head of Department: Engr. Dr. D.O. Dike

Editors:

Engr. Dr. D. O. Dike

Engr. Dr. L.O. Uzoechi

Engr. Dr. G.C. Ononiwu

Engr. U.C. Iwuchukwu

Mr. C. F. Paulinus-Nwammuo

Disclaimer: This Student Handbook and Information Guide is solely intended to be an aid and guide to Electrical/Electronic Engineering students and other persons interested in the study of Electrical/Electronic Engineering or have general knowledge of Electrical/Electronic Engineering as offered in FUTO. It is not intended to be an authority on the status of the issues contained therein as the University, its departments and sections modify its official documents periodically and regularly.

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HIS EXCELLENCY MUHAMMADU BUHARI, GCFR
*PRESIDENT, COMMANDER-IN-CHIEF OF THE ARMED FORCES
FEDERAL REPUBLIC OF NIGERIA*

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LAMIDO ADAMAWA

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B.Sc. (Nig.), M.Sc. (Dundee), Ph.D. (Nig.), FSES, FMP

DEPUTY VICE-CHANCELLOR (ACADEMIC)

PROF. OKORO OGOBE
B.Sc. (Ibadan), M.Sc. (Zaria), Ph.D. (England), FPIN

DEPUTY VICE-CHANCELLOR (ADMINISTRATION)

PROF. ISRAEL C. NDUKWE, KSC
B.Sc. (Nig.), M.Sc. (Nig.), Ph.D. (Nig.)

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BURSAR

MR. DON NWOKEOCHA
B.Sc. (Nigeria), MBA, CAN, MNIM

UNIVERSITY LIBRARIAN

DR. MRS. CHINWE V. ANUNOBI
B.Ed. (Nig.), M.L.S., Ph.D., CLN



VICE-CHANCELLOR

PROF. FRANCIS C. EZE, KSJI, JP
B.Sc. (Nig.), M.Sc. (Dundee), Ph.D. (Nig.), FSES, FMP

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1.0 INTRODUCTION

Electrical and Electronic Engineers are principally concerned with the design, production and use of systems, subsystems, components and devices whose operation depends on electrical and electronic engineering effects. The entire field of electrical and electronic engineering has expanded rapidly in the last decades and now encompasses a wide range of professional activities. Because of its diversity, it is impossible for an electrical and electronic engineer to be a specialist or expert in all the branches of the field. Normally specialization is required in consonance with national goals and objectives. For self-reliance and rapid industrialization, graduates with easily identifiable and readily applicable expertise in appropriate areas are required. Some of these areas include:

- i. Communication Engineering
- ii. Electronic and Computer Engineering
- iii. Power Systems Engineering

The Department of Electrical and Electronic Engineering currently offers courses leading to the Bachelor of Engineering with specialization in these three areas.

2.0 OPPORTUNITY FOR GRADUATES

The Electrical and Electronics Engineering graduates are expected to, first and foremost, be job creators rather than job seekers. They are therefore to create technical designs and job opportunities in their areas of specialization either on an individual or corporate basis. However, they can easily find gainful employment in the obvious areas of communications, computing and electrical (power) industries as:

(a) Electronic Engineers

There continues to be a demand for graduate engineers across many branches of electronics industry. This includes research, development, production and sales opportunities in industries such as telecommunications, computer hardware and software, satellite and

space technology and microelectronics. The practical engineer continues to have a significant role to play in the engineering industry. A wide range of career opportunities is available in the manufacturing, petrochemical, control and processing industries, electricity supply and the service industries including the financial and banking sector.

(b) Electrical Engineers

Electrical engineering is one of the most wide-ranging and vital parts of the engineering profession, encompassing the generation, transmission, distribution and utilization of electrical energy. There continues to be a demand for power engineers, not only in the electricity supply industries, but also in the application of electricity involving industries such as transportation, steel, marine, offshore, consumer goods and the utilities.

(c) Computer/Information Systems Engineers

Career opportunities exist across a wide spectrum in all aspects of information systems hardware and software development in organizations that use information system, either for support or as products.

(d) Communication Engineers

Career for graduates are available at a number of levels in communication companies. In particular, one can choose to work in Telecommunications, Network Design and Implementation, Network Management and Planning fields. Also opportunities abound in the areas of cellular and mobile telephony, wireless communication, microwave systems, Internet service provision and satellite technology for communication engineers. Television and radio broadcasting corporations employ thousands of communications engineers.

(e) Engineering and Business Managers

Graduates with a technical background and the analytical skills of an engineer, plus knowledge of business and management have numerous

career opportunities. The status and financial rewards for business literate engineers are rising rapidly as companies discover that engineering solutions are essential to their competitive edge.

(f) Business Information Analysts

Career opportunities exist as systems analysts, system designers, project managers, and consultants in a wide range of companies, both those that use computerized information systems and those who sell information system products. Also, career opportunities exist working as part of a business systems development team and pre-sales or post-sales support for business IT products and consultancy.

(g) Others

In addition to (a) – (f), employment opportunities exist in other areas such as in the oil industry, shipping and banking industries, general management and security establishments, education and other technological institutions.

Specifically, prospective employers of the graduates include the various Electric Supply Industries (ESI), Rural Electrification Boards, all Federal and State Ministries, Telecommunication Industry, Nigeria Ports Authority, Nigerian National Petroleum Company, all Oil Companies, Banks, Private Institutions, Security Organization, Academia, etc.

3.0 ADMISSION REQUIREMENTS

The admission requirements for the undergraduate degree programme are outlined as follows:

(a) UTME Entry Requirements

Five (5) O' Level GCE/SSCE (Senior School Certificate Examination) credits including English, Physics, Mathematics and Chemistry. The students so admitted by this mode run the 5-year B. Eng. curriculum.

(b) Direct Entry Requirements

- i. HSC/GCE 'A' Level passes in two relevant subjects with SC/GCE 'O' Level credit passes (including English Language) in three other subjects in not more than two sittings.
- ii. HSC/GCE 'A' Level passes in three relevant subjects with SC/GCE 'O' Level credit passes (including English Language) in two subjects in not more than two sittings.
- iii. Holders of OND (Ordinary National Diploma) certificates are eligible for admission into year II provided that their programmes cover certain basic courses offered in the relevant School up to the second year. Holders of HND are eligible for admission into year III depending on the appropriateness of their requisite academic preparation.
- iv. In addition to fulfilling the conditions stipulated in (c) above, a holder of OND (ND) and/or HND must have SC/GCE O' Level credits in Mathematics, Physics, and Chemistry.

4.0 FACILITIES AVAILABLE

Students of the department have available to them school workshops, drawing Studios and laboratories for University foundation and School of Engineering common courses. Such foundation and common course students share also computers with requisite software facilities in the University Computer Center and the Center for Information Communication Technology (ICTC) with good internet access. These facilities and others in the Centre for Industrial Studies are easily accessible for teaching and research.

In addition to the general facilities, the department has a well-developed power systems and machine laboratories, digital electronics laboratories, communications and antennas laboratories, microwave work bench and

process control laboratories, optical fibre training kit, basic electronics, microprocessor /microcomputer applications facilities as well as a Robotics Laboratory. The Center for Energy and Power Systems Research, Multimedia and E-Library centre with access to University Digital Library and IEEE Digital Resource Database provide in-house facilities within the department to enhance teaching and research.

5.0 TRAINING PHILOSOPHY

The training philosophy is in line with that of the School of Engineering and Engineering Technology, namely; to produce self reliant graduates in Electrical and Electronic Engineering who possess requisite high academic standard, well-integrated with superior practical training in their areas of specialization, and who are immediately productive in self or other gainful employment in these areas.

The above philosophy entails:

- (a) Adequate exposure to foundation science and general studies (Use of English, Social Sciences, Humanities, etc) and Computer Literacy courses.
- (b) Sufficient exposure to basic engineering and technology techniques.
- (c) A good grounding in all the main aspects of Electrical and Electronic Engineering discipline.
- (d) Special skills and in-depth study in the students' areas of specialization.

The above process involves among other things, lectures, tutorials, laboratories, engineering/technology workshop practices, design studio works, industrial attachments and supervised investigations or case studies of local engineering technology problems in the discipline and/or area of specialization.

6.0 AREAS OF SPECIALIZATION

The Department of Electrical and Electronic Engineering in fashioning out its undergraduate programmes and courses, is mindful of the national goals and objectives of self-reliance, rapid technological growth and industrialization for which there is currently a serious dearth of the much-needed high level manpower. These areas are:

- (i) Power Systems Engineering, concerned with generation, transmission and distribution of electrical power, and its use in electro-mechanical and electro- thermal systems and devices, etc.
- (ii) Communication Engineering, dealing with the transmission of speech, text, images and data over the telephone networks or any other transmission media, radio transmission and reception systems design and production, mobile radio telephony, telex and telegraphy, television transmission and reception, microwave-satellite systems and links, optic fibre, voice over internet protocol, WiFi, WiMax, broadband communication etc.
- (iii) Electronic and Computer Engineering, concerned with the use of microprocessors/ microcomputers in electronic systems for control and instrumentation, embedded systems, self-learning systems, design and fabrication of electronic devices, discrete circuits, integrated and very large integrated circuits, design and construction of electronic instruments and units, computer software and hardware design and development, etc.

7.0 AIMS AND OBJECTIVES

The Department's aim and objectives are in line with those of the School and these are geared towards the realization of national needs and aspirations. Graduates from the Department are expected, among other things to:

- (a) Be job creators in their areas of specialization in particular and in the Electrical and Electronic Engineering discipline in general.

- (b) Design and construct systems and components primarily in their areas of specialization.
- (c) Supervise the installation, commissioning and maintenance of Electrical and Electronic Engineering systems and components.
- (d) Design, develop and produce innovative products and techniques for industrial growth.
- (e) Adapt and adopt indigenous technology in order to solve engineering and technology problems in the relevant area of specialization in particular and electrical and electronics engineering in general.

8.0 STRATEGIC PLAN FOR THE DEPARTMENT (2014 - 2020)

VISION

The Vision of the department is to train competent electrical and electronic engineers with easily identifiable expertise in one of the following options:

- a. Communication Engineering
- b. Electronic and Computer Engineering
- c. Power Systems Engineering

MISSION

The Department will provide an enabling environment for effective teaching; research and training of world class electrical/electronic engineers who are knowledgeable in entrepreneurship and can contribute to national development.

OBJECTIVES

In view of the increasing population of undergraduates, the departmental laboratories, classrooms and staff offices need to be re-equipped and expanded. Many more things need to be done with the meager funding from government. Thus, in order to be able to make the best of a

difficult situation, in the next ten years, the department will concentrate on the following objectives:

- a. To produce graduate-entrepreneurs who are job creators and not job seekers in their areas of specialization in particular and in the electrical and electronic engineering discipline in general.
- b. To produce graduates who can design and construct systems and components primarily in their area of specializations for industrial growth.
- c. To establish appropriate linkages with the industry and other institutions involved in training, research and development both local and international.
- d. To enhance our postgraduate research programme.
- e. To accumulate a pool of professionals who can develop, propagate and sustain information and Communication Technology.

PHILOSOPHY

Our philosophy is to produce self-reliant graduates who will use technology for service. The above philosophy entails

- a. Adequate exposure to foundation science, computing and general studies.
- b. Sufficient exposure to basic engineering and technology
- c. Sufficient exposure to stimulating entrepreneurial competencies.

STRENGTHS

The department is proud of its achievement since inception. Our graduates are doing very well in the industry. In 1994, the National Universities Commission accreditation exercise ranked us the best Electrical/Electronic Engineering department in the country. Our strengths lie in the following areas:

- i. Rich curriculum
- ii. Dedicated qualified academic staff and technologists

- iii. Brilliant students
- iv. Good leadership
- v. Stable academic calendar
- vi. Quiet and conducive learning environment
- vii. Innovative and focused research tailored to solving prevailing Local, National and Global problems.

WEAKNESSES

With the worsening state of the national economy and absence of industries, all young people have no alternative after secondary school than to seek for admission into tertiary institutions. This has resulted in the continuing increase in the student population, which has put our facilities under tremendous stress. Thus, our weaknesses are evident in the following areas:

- i. Large classes
- ii. Inadequate infrastructure (classrooms, lecture theatres, laboratories and staff offices).
- iii. Inadequate Campus Local Area Network.
- iv. Inadequate library collection.
- v. Inadequate equipment and teaching aids.

THREATS

Our major threats are in the following areas:

- i. Epileptic power supply.
- ii. Non-existence of sporting and recreational facilities.
- iii. Inadequate space.
- iv. Insufficient student accommodation on campus leading to overcrowding, indiscipline, stress and depression.
- v. Examination Malpractice.

- vi. Lack of on-campus staff accommodation leading to suspension of academic activities after 4:00pm.

OPPORTUNITIES

Electrical Engineering has to do with improving productivity in all aspects of human endeavour hence there are numerous opportunities for consultancy in the power industry, telecommunication and computing. However, some of the hurdles in exploiting the opportunities are lack of support for research activities by corporate organizations and inadequate research facilities.

ACTION PLANS

On Staff Development

- i. Academic and technical staff will be encouraged to attend relevant workshop and conferences at least once a year in order to be abreast with technological advancement in the field.
- ii. Logistics will be put in place that will make it imperative for every staff to own a computer.
- iii. Staff will be encouraged to publish research findings regularly.
- iv. Department has started experimenting on the development of research incubation program wherein novel research products will be continuously pursued till finished and patentable products are produced. This program will appropriately fit into the University Research Incubation Center already under construction
- v. Every staff, particularly those in non-professorial cadres, have been directed to come up with a personal career development plan which will be vigorously pursued. In this wise, training of academic staff for M.Sc. and Ph.D degrees will be intensified w.

The already existing students and faculty exchange programs with some Universities abroad will be pursued more vigorously.

- vi. Recognition of hardworking staff will be given due attention.

On Departmental Administration

- i. A departmental administrative structure has been developed defining clearly vertical and horizontal flows of authority. Eight clearly distinguishable research groups with each of the senior academics in Professorial cadre heading each team.
- ii. The work in the department has been decentralized by the creation of various committees and appointment of Chairmen and Coordinators to head each Committee and task respectively.
- iii. The revision of the curriculum to meet the changing trends of the industry will be given greater attention.
- iv. A departmental calendar of statutory meetings have been developed and included in the University calendar. The department plan to publish this in its 2017 calendar to make it easier for better planning for all staff. This will enable lectures, laboratory, test and other forms of continuous assessment will be easily tracked, and results produced on schedule.
- v. The practice of Course allocation on time and in such a way that staff expertise is recognized and that courses are shared whenever more than one lecturer is available will continue.
- vi. Due regard and attention will be given to staff welfare at all times.
- vii. E-learning will be used to improve the teaching of large classes as soon as facilities become available.

EEE DEPT STAFF APPOINTMENTS 2016

S/N	POSITION	STAFF
1	Chairperson, EEE Strategic Planning & Innovations Director, Public Procurement Research Center, FUTO	Engr. Prof. (Mrs) G.A. Chukwudebe
2	Chairman, EEE 2016 NUC Central Accreditation Committee Director, Center for Energy & Power Syst. Research FUTO	Engr. Prof. E. N. C. Okafor
3	Director, Information Communication Techn. Center, FUTO	Engr. Prof. M. C. Ndinechi
4	Coord., EEE Research, Human Resource Dev. & Linkages	Engr. Dr. F.K. Opara
5	Coord., EEE SERVICON Committee & Staff Adviser, Society of Electrical & Electronic Engineering Students (SEES)	Engr. Dr. (Mrs.) G. N. Ezech
6	Ag. Head, EEE Department FUTO Chairman, EEE Quality Assurance and Control Committee	Engr. Dr. D. O. Dike
7	Chairman, EEE Welfare Committee	Engr. Dr. C. C. Mbaocha
8	Coordinator, EEE Students Training & Certifications	Dr. (Mrs.) I. E. Achumba
9	Coordinator, EEE Undergraduate Projects	Dr. O. J. Onojo
10	EEE Exam & Timetable Officer Associate Dean, Students' Affairs Unit, FUTO	Engr. Dr. L. O. Uzoechi
11	Coordinator, EEE Seminars, e-Learning & e-Library	Engr. Dr. G. C. Ononiwu
12	Coordinator, EEE Postgraduate Studies	Engr. Dr. N. Chukwuchekwa
13	Coordinator, EEE Quality Assurance & Control Coordinator, COE & ECE Lab	Engr. Dr. C. K. Agubor
14	Coordinator, Power & Machine Lab	Engr. Dr. M. Olubiwe
15	Coord., EEE Students Industrial Works Experience (SIWES)	Engr. Dr. O. C. Nosiri
16	Chief Technologist & Head EEE Laboratories	Mr. R. A. I. Opara
17	Department Admin Officer (DAO) & Sec EEE Department	Mr. O. Okoreaffia

EEE DEPT FUTO RESEARCH GROUPS 2016

GROU P NO	RESEARCH FOCUS	PRINCIPAL RESEARCHER	ASSISTANT
1	Power Electronic & Control	Engr. Prof. S.O.E Ogbogu	Engr. Dr. C.C. Mbaocha
2	Computer Engineering & Application	Engr. Prof. (Mrs) G.A. Chukwudebe	Dr. Mrs. I.E. Achumba
3	Energy & Power Systems	Engr. Prof. E. N. C. Okafor	Dr. O.J. Onojo
4	Signal Processing & Wireless Sensor Network	Engr. Prof. M. C. Ndinechi	Engr. Dr. C.K. Agubor
5	Electronics, Embedded Systems & Database Mgt	Engr. Dr. F.K. Opara	Engr. Dr. G.C. Ononiwu
6	Microwave & Wireless Communication	Engr. Dr. (Mrs) G. N. Ezech	Engr. Dr. N. Chukwuchekwa & Engr. Dr. O. C. Nosiri
7	Power System Integration, Stability, Electricity Market/ Economics & Renewable Energy	Engr. Dr. D. O. Dike	Engr. Dr L.O. Uzoechi
8	Machines and Drivers	Engr. Dr. F. I. Izuegbun	Engr. Dr. M. Olubuwe

On Students Development

- Efforts in producing industry ready students will continue.
- More attention will be given to industrial visits and in all cases staff should accompany students.
- Acquisition of entrepreneurial skills will be encouraged.
- Students advisory will be improved through the usage of Students Electronic Album System (SEAS) which was developed in the department.
- With SEAS, students will have no option to success than studying hard as cases of impersonation will be eliminated.
- Hardware and software skills will be emphasized when giving assignments and studio projects.
- Special topic lectures from the industry and role modeling will continue as an annual event for fourth and fifth year students.

On Research and Development

- Existing research collaboration will be sustained and more visits undertaken to attract research grants from the industry.
- A small scale Assembly plant for Electronic and IT equipment will be established.
- A helpdesk will be established to assist other members of the University community once the campus is networked.
- Efforts will be geared towards becoming a centre of excellence on software engineering in the next five years.
- Department is making effort to working out collaboration to develop a micro-electronic fabrication lab, particularly to establish a solar panel fabrication lab.

9.0 COURSE STRUCTURE

All the students undergo the same courses in their first three years of study in which they are exposed to foundation science and general studies courses, computer literacy courses, basic engineering and technology courses and basic departmental or discipline courses. As the students enter their fourth and fifth years of study, they concentrate

mainly on the courses in their area of specialization, while taking up other relevant courses (departmental or otherwise) necessary for full professional training.

Common courses and multi-lecture techniques have been introduced to minimize capital and operating costs and duplication of efforts while at the same time maximizing the use of human and material resources. In addition, personalized teaching and use of tutorials, seminars and other continuous assessment methods are employed to provide maximum learning experience for the students.

Apart from the workshop and laboratory training designed to impart practical skills to the students, other training programmes such as studio courses, vacations and semester industrial attachments are compulsory to ensure that students acquire hands-on-experience.

10.0 WORKSHOP/CENTRE FOR INDUSTRIAL STUDIES (CIS) TRAINING PROGRAMME

The student is expected to undergo a comprehensive hands-on practical training involving learning-by-doing skills and practices of engineering and engineering technology from the basics in the early years of study to the advanced skills and practicals in the later years. Some of the basic skills and practices involved in this “hands-on-experience” include sheet metal working, welding and fabrication, shaping, filing and fitting techniques; electrical workshop practices, electronic workshop practices, automobile diagnosis and maintenance and concrete technology and surveying techniques. In addition, he/she acquires technical drawing principles particularly in the lower years. The Centre for Industrial Studies presently provides most of the above training.

11.0 ON-CAMPUS INDUSTRIAL TRAINING PROGRAMME

Apart from the workshop training programme, the students are expected to undergo tutorial in engineering processes and industrial studies courses which are; organization and management, engineering products design, development and production techniques, engineering maintenance, services and repairs, engineering law and quality control, testing and inspection, and so on, and then carry out with confidence actual multi-disciplinary and group projects relevant to local problems.

12.0 OFF-CAMPUS INDUSTRIAL TRAINING PROGRAMME

This consists of three long vacations of a minimum of two months each and one full semester (the eighth semester of studies) attachment in established industries where the skills and practices learnt in the workshop training and in the taught courses are applied in real life industrial environment. The student is initially exposed to training in all disciplines of engineering and subsequently his/her training is gradually tailored to his professional area, under the supervision of a professionally recognized industry-based engineer.

13.0 PROJECTS, ANALYSIS AND DESIGN STUDIO TRAINING PROGRAMME

This training programme which begins in the third semester of the student's degree programme concerns projects-permeated to creative education. This enables the student to formulate and solve real engineering problems, carry out detailed investigations, design/construct useful engineering components/systems in particular professional areas. Groups and interdisciplinary projects where students are required to work on case studies and projects with actual local practice or relevant to local problems are mostly encouraged.

14.0 SEMINARS, INDUSTRIAL VISITS AND SPECIAL LECTURE PROGRAMMES

Each graduating student is required in his final year to present a seminar on an approved topic (analytical/experimental in his/her area of specialization (option)). Industrial visits to appropriate establishments will be made and the student's participation and knowledge acquired in these visits is assessed on the basis of written reports submitted by the student. In addition, invited lecturers with years of industrial experience are invited to deliver lectures to the students on selected and relevant topics from the recent advances in their specialized areas.

15.0 ACADEMIC REGULATIONS FOR UNDERGRADUATE STUDENTS SECTION

SECTION 1: REGISTRATION & MATRICULATION

1.1 Registration:

The student shall be required to present himself/herself for registration for the programme of study for which he/she has been accepted in accordance with the procedure approved, at the time, by the University.

1.2 Registration Period:

- i. Registration for various courses under the programme shall take place once per session at the beginning of the Harmattan Semester. Registration shall end as directed by the university management. Students shall return registration forms to their Head of Department as directed. Students who return their forms later than the due date shall pay a late registration fee as specified.
- ii. Late registration may be allowed only in exceptional cases with the special permission of the Registrar in consultation with Schools upon the payment of a fee as specified. No late registration shall be allowed more than two weeks after lectures begin.
- iii. If for some genuine reasons a student is not able to return to the campus to register within the two weeks period stipulated, the Registrar must be notified immediately in writing. Approval for such late registration shall be given by the Senate. In exceptional cases the Vice-Chancellor may act on behalf of the Senate.
- iv. All completed registration forms shall reach the Dean of the School not later than two weeks after commencement of lectures.
- v. Students shall not be permitted to attend classes or laboratory or to use the University Library or any other facility of the University until they have registered.

1.3 Registration Procedure:

- i. Freshmen on arrival report at the Registry for identification and then at the Health Centre for health clearance.

- ii. Students pay the prescribed fees at the Student Accounts of Students Affairs Unit.
- iii. Students present official receipts at the Academic Affairs Division of the Registry to show proof of payment.
- iv. Students obtain academic clearance and thereafter collect five course registration forms from the Registry (or from any other place designated for that purpose). The forms are stamped "VALID" before collection.
- v. Students proceed to their respective Schools and Departments for academic advising, class scheduling and registration. Students must ensure that the information supplied in the registration forms complies with registration guidelines, as they shall be held responsible for errors in completing registration forms.
- vi. Students shall notify the Registrar as soon as possible of any subsequent change in the information, which they have given at registration relating to home address, choice of course and source of financial support.
- viii. Copies of the signed forms are distributed by the Dean, to the Head of Department, Registrar, Director of Academic Planning and Development, and the student not later than 21 days after the first day of lectures.
- ix. The Head of Department should have the forms duly signed and returned to the Dean within the stipulated time. (1.2 iv above)
- ix. The Dean produces the class lists according to courses within five weeks of the commencement of lectures.
- x. The Registrar publishes Master Class list at least six weeks before the first day of examinations in the Semester.

1.4 Matriculation Procedure:

- i. All new students who have completed registration and fulfilled their financial obligations are formally admitted to the University at Matriculation. Nobody may claim to be a student of this

- University until he has duly completed all matriculation formalities including issuance of ID cards.
- ii. No matriculated student of this University shall re-present himself for subsequent matriculation.
- iii. Any student who is absent from Matriculation shall submit an application to the registrar for deferment of Matriculation. In case of ill health, this shall be supported by a valid medical report from an approved Medical Officer and certified by the Director of Health services.
- iv. Only matriculated students may with the approval of the Senate, defer their admission.
- v. All the processes of admission and registration shall end at matriculation.

1.5 Statement of Undertaking:

All students shall sign a statement of undertaking at registration that they will comply with the regulations of the University.

1.6. Loss of Identity Card:

A student who loses his identity card must inform the Registrar immediately in writing. A duplicate identity card shall be issued on payment of a fee of N300. 00.

SECTION 2: ADDING AND DROPPING OF COURSES

2.1 Adding of Courses:

Students may be permitted to add courses not later than four weeks after lectures have started for the Semester. Approved forms should be obtained from and returned to the Registrar after the Dean and the Head of Department have signed them.

2.2 Dropping of Courses:

Students may be permitted to drop courses not later than four weeks after Lecture have started for the Semester Approved

forms should be obtained from and returned to the Registrar after they have been signed by the Dean and the head of Department.

SECTION 3: INDEBTEDNESS TO THE UNIVERSITY

- 3.1. The use of University facilities shall be withdrawn from any student who is indebted to the University. Facilities include all forms of academic instruction and supervision, the University Library and residential accommodation owned and/or administered by the University.
- 3.2. Except with the permission of the Vice-Chancellor, no student who is indebted to the University shall be allowed to continue his registration in the University unless such indebtedness is cleared.

SECTION 4: CLASS PERIOD AND ATTENDANCE.

4.1 Duration of Classes

Class is expected to begin on the half hour and to end 10 minutes before the next period. Seminars, tutorials, laboratory practicals and workshops shall however continue for as long as scheduled.

4.2 Class Attendance

Only a student who has been properly registered for a course and whose name appears on the official class list for that course shall be allowed into a class. Students are expected to attend all classes for courses, which they are registered. Attendance at classes, laboratories, and other practicals is compulsory.

4.3 Absence from classes

If a student is absent from prescribed instructions for more than three weeks during any one semester, it may not (except with the permission of the Senate or the Vice-Chancellor acting on behalf of the Senate) be included as part of the scheme of study which the student is required to complete.

SECTION 5: WITHDRAWAL FROM THE UNIVERSITY

5.1 Voluntary Withdrawal:

- i. Students who wish to withdraw from the University shall notify the Registrar in writing through the Dean of the School and the Head of Department. The period of withdrawal shall not exceed one academic year and shall be subject to approval by the Senate.
- ii. For freshmen, the written notice of withdrawal shall be given not later than two weeks after matriculation. For other students, the notice shall be given not later than four weeks after the beginning of the semester.

LIST OF COURSES

ELECTRICAL ELECTRONIC ENGINEERING COURSE OUTLINE

HARMATTAN SEMESTER YEAR ONE						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
GST 101	Use of English I		1	1	0	2
GST 103	Humanities I		1	0	0	1
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
HARMATTAN SEMESTER YEAR ONE ELECTIVES						
FRN 101	Use of French I		1	0	0	1
IGB 101	Introduction to Igbo I		1	0	0	1
		TOTAL	12	4	5	21

RAIN SEMESTER YEAR ONE						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
GST 102	Use of English II		1	1	0	2
GST 108	Social Science I		1	1	0	2
GST 110	Science, Technology & Society		1	0	0	1
MTH 102	Elementary Mathematics II		2	2	0	4
PHY 102	General Physics II		2	1	1	4
CHM 102	General Chemistry II		2	1	1	4
ENG 102	Workshop Practice I		0	0	1	1
ENG 104	Engineering Drawing II		0	0	1	1
RAIN SEMESTER YEAR ONE ELECTIVES						
FRN 102	Use of French II		1	0	0	1
IGB 102	Introduction to Igbo History, Culture & Literature		1	0	0	1
		TOTAL	10	6	4	20

HARMATTAN SEMESTER YEAR TWO						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
GST 201	Social Sciences II		1	0	0	1
MTH 203	Elementary differential Equations I	MTH101, MTH 102	2	1	0	3
MTH 211	Statistics	MTH 101, MTH102	2	1	0	3
CSC 201	Computer & Applications	MTH101, MTH 102	2	1	1	4
ENG 201	Workshop Practice III	ENG 101, ENG 102	0	0	1	1
ENG 203	Engineering Drawing III	ENG 103, ENG 104	0	0	1	1
ENG 207	Introduction to Engineering Materials I	CHM 102, PHY 102	1	1	0	2
ENG 209	Engineering Thermodynamics		2	1	0	3
ENG 213	Engineering Mechanics I (Statics)	MTH 101, PHY 101	1	1	0	2
ENG 217	Engineer in Society		1	0	0	1
		TOTAL	12	6	3	1

RAIN SEMESTER YEAR TWO						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
MTH 202	Mathematical Methods II	MTH101, MTH 102	2	1	0	3
ENG 206	Workshop Practice IV	ENG101,ENG 102	0	0	1	1
ENG 208	Introduction to Engineering Materials II	CHM 102, PHY 102	1	0	1	2
ENG 212	Engineering Economy		1	1	0	2
ENG 214	Computer Programming for Engineering Applications	MTH 102	1	0	1	2
ENG 224	Engineering Mechanics II (Dynamics)	MTH 101, PHY 101	1	1	0	2
ENG 226	Introduction to Electrical Electronic Engineering	MTH 102, PHY 102	1	1	1	3
EEE 202	Basic Electronic Engineering		1	0	1	2
EEE 204	Digital Logic Technique		1	0	1	2
EEE 206	Electrical Electronic Engineering Studio I	MTH 102, PHY 102	0	0	1	1
		TOTAL	9	4	7	2

SIW 200 Long Vacation SIWES

0 0 2 2

HARMATTAN SEMESTER YEAR THREE						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
ENS 301	Introduction to Entrepreneurship and Innovation		1	0	1	2
ENG 307	Engineering Mathematics I	MTH 203	2	1	0	3
ENG 305	Strength of Materials I		1	1	1	3
ENG 309	Fluid Mechanics I		2	0	1	3
ENG 313	Engineering Writing & Presentation		1	1	0	2
EEE 301	Network Theory I	ENG 226	1	1	0	2
EEE 305	Electromagnetic Fields & Waves	MTH 201, ENG 226	1	1	0	2
EEE 307	Engineering Control Systems Analysis & Design I		1	1	0	2
EEE 311	Computer Organization & Architecture	EEE 204	1	1	0	2
		TOTAL	11	7	3	1

RAIN SEMESTER YEAR THREE						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
ENG 308	Engineering Mathematics II	MTH 202, ENG 307	2	1	0	3
ENS 302	Business creation, growth and corporate governance		1	0	1	2
EEE 302	Electrical Electronic Engineering Studio II		0	0	1	1
EEE 306	Network Theory II	EEE 301	1	1	0	2
ECE 302	Theory of Electronic Instrumentation & Measurements	ENG 226	1	1	0	2
ECE 316	Applied Electronics	EEE 202	1	1	1	3
COE 318	Principles of Electronic Communication		1	1	1	3
PSE 312	Electrical Power & Machines	ENG 226	1	1	1	3
		TOTAL	8	6	5	9

SIW 300 Long Vacation SIWES

0 0 2 2

HARMATTAN SEMESTER YEAR FOUR (COE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
ENG 405	Engineering Management & Law		1	1	0	2
EEE 401	Microprocessor Systems & Applications	EEE 311	1	1	1	3
EEE 405	Process Control Technology		1	1	0	2
EEE 407	Introduction to Linear System Theory	MTH 201, ENG 308	1	1	0	2
EEE 409	Electrical Engineering Analysis	ENG 308	1	1	0	2
COE 405	Fields & Waves in Communications	EEE 305	1	1	0	2
COE 407	Modern Telephone Systems		1	1	0	2
COE 411	Communications I	COE 318	2	1	0	3
COE 413	Communication Engineering Studio I	COE 318	0	0	1	1
		TOTAL	9	8	2	19
YEAR FOUR COE OPTION ELECTIVE						
COE 409	Introduction to Underwater Sonics	EEE 301, EEE 305	1	1	0	2

HARMATTAN SEMESTER YEAR FOUR (ECE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
ENG 405	Engineering Management & Law		1	1	0	2
EEE 401	Microprocessor Systems & Applications	EEE 311	1	1	1	3
EEE 405	Process Control Technology		1	1	0	2
EEE 407	Introduction to Linear System Theory	MTH 201, ENG 308	1	1	0	2
EEE 409	Electrical Engineering Analysis	ENG 308	1	1	0	2
ECE 405	Semi-Conductor Devices Technology		1	1	0	2
ECE 407	File, Database Systems and Management		1	1	0	2
ECE 409	Introduction to Compiler Design & Construction		1	1	0	2
ECE 411	Advanced Electronics & Studio I		1	1	1	3
COE 407	Modern Telephone Systems		1	1	0	2
		TOTAL	10	11	2	22

HARMATTAN SEMESTER YEAR FOUR (PSE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
ENG 405	Engineering Management & Law		1	1	0	2
EEE 401	Microprocessor Systems & Applications	EEE 311	1	1	1	3
EEE 405	Process Control Technology		1	1	0	2
EEE 407	Introduction to Linear System Theory	MTH 201, ENG 308	1	1	0	2
EEE 409	Electrical Engineering Analysis	ENG 308	1	1	0	2
PSE 409	Electric Power Plants		1	1	0	2
PSE 411	Electrical Machines	PSE 312	1	1	1	3
PSE 413	Electrical Power System & Studio I	PSE 312	1	1	1	3
		TOTAL	8	8	3	19

YEAR FOUR GENERAL ELECTIVE						
EEE 403	Principles of Energy Process		1	1	0	2
SIW 400	Rain Semester SIWES		0	0	4	4
SIW 401	Long Vacation SIWES		0	0	2	2

HARMATTAN SEMESTER YEAR FIVE (COE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
EEE 501	Engineering Control System Analysis & Design II	EEE 307	2	1	0	3
COE 501	Project I		0	0	3	3
COE 503	Communication Engineering Studio II	COE 411	1	0	1	2
COE 505	Optical Transmission Systems	COE 411	2	1	0	3
COE 507	Seminar & Industrial Visits		1	1	0	2
COE 509	Principles of Radio & TV Broadcasting	COE 318	1	1	0	2
COE 513	Data Communications	COE 411	2	1	0	3
		TOTAL	9	5	4	18

RAIN SEMESTER YEAR FIVE (COE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
COE 502	Project II		0	0	3	3
COE 504	Microwave Communication Systems		2	1	0	3
COE 506	Communication Network, Planning & Management		2	1	0	3
COE 508	Principles of Radar & Navigation Systems		2	1	0	3
COE 510	Quality, Reliability & Maintenance of Comm. Systems		2	1	0	3
COE 512	Special Topics in Engineering		0	3	0	3
COE 514	Communication Antenna & Measurements		2	1	0	3
		TOTAL	10	8	3	21
YEAR FIVE COE OPTION ELECTIVE						
COE 511	Digital Filtering & Signal Processing	EEE 313, EEE 409	2	1	0	3

HARMATTAN SEMESTER YEAR FIVE (ECE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
EEE 501	Engineering Control System Analysis & Design II	EEE 307	2	1	0	3
ECE 501	Advanced Computer Techniques	EEE 401	2	1	0	3
ECE 503	Project I		0	0	3	3
ECE 505	Electronic Computer Engineering Studio II		1	0	1	2
ECE 507	Seminar & Industrial Visits		1	1	0	2
ECE 509	Industrial Electronics		2	1	0	3
COE 513	Data Communication	COE 318	2	1	0	3
		TOTAL	10	5	4	19

RAIN SEMESTER YEAR FIVE (ECE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
ECE 502	Advanced Electronics II		2	1	0	3
ECE 504	Project II		0	0	3	3
ECE 506	Computer Applications Lab		0	0	2	2
ECE 508	Digital Instrumentation		2	1	0	3
ECE 510	Reliability & Quality Assurance in Electronics		2	1	0	3
ECE 512	Special Topics in Electronic & Computer Engineering		2	1	0	3
ECE 514	Introduction to VLSI Design		2	1	0	3
		TOTAL	10	5	5	20
YEAR FIVE ECE OPTION ELECTIVES						
ECE 511	Introduction to Medical Electronics		2	1	0	3
ECE 513	Introduction to Operating Systems		2	1	0	3

HARMATTAN SEMESTER YEAR FIVE (PSE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
EEE 501	Engineering Control System Analysis & Design II	EEE 307	2	1	0	3
ECE 509	Industrial Electronics		2	1	0	3
PSE 501	Project I		0	0	3	3
PSE 503	Power System Engineering Studio I		1	0	1	2
PSE 505	Seminar & Industrial Visits		1	1	0	2
PSE 507	High Voltage Engineering Technology		2	1	0	3
PSE 511	Optimization Techniques for Power Systems		2	1	0	3
PSE 513	Power System Planning, Reliability & Economics		2	1	0	3
		TOTAL	12	6	4	22

RAIN SEMESTER YEAR FIVE (PSE OPTION)						
COURSE CODE	COURSE TITLE	PRE-REQ	L	T	P	U
PSE 502	Project II		0	0	3	3
PSE 506	Electric Drive Systems	PSE 403	2	1	0	3
PSE 508	Rotating Machine Control	PSE 312, EEE 307	2	1	0	3
PSE 510	High Voltage DC Transmission		2	1	0	3
PSE 512	Power Systems Protection		2	1	0	3
PSE 514	Special Topics in Power Systems Engineering		2	1	0	3
PSE 516	Electromagnetic of Electrical Machines	EEE 305	2	1	0	3
		TOTAL	12	6	3	1
YEAR FIVE GENERAL ELECTIVES						
EEE 502	Microwave Components & Measuring Techniques		2	1	0	3
EEE 504	Computer Networks		2	1	0	3
EEE 506	Introduction to Optimal Control		2	1	0	3

KEY	
L	LECTURE
T	TUTORIAL
P	PRACTICAL
U	UNITS
PRE-REQ	PRE-REQUISITE

DETAILS OF COURSE CONTENT

UNIVERSITY COURSE (UC)

Code: MTH 101
Credit Unit: 4
Title: Elementary Mathematics I

Rationale:

To provide a background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems. The course starts at a level, which is appropriate to students who may not come through traditional educational routes

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Number systems. Indices. Surds and Logarithms. Polynomials, Remainder and factor theorems. Polynomial equations. Rational functions. Partial fractions. Fields. Ordered fields. Inequalities. Mathematical induction. Permutations and combinations. Binomial 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-Morgan's theorem, n-th roots of complex numbers. Elementary Set theory. Venn diagrams and applications. 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 Triangle. Solution of trigonometric equations. Inverse trigonometric functions. Functions, Concept and Notation. Examples. Composition. Exponential and logarithmic functions. Graphs and properties. Limits and continuity. Techniques for finding limits. The derivative. Calculation from first principles. Techniques of differentiation. Chain rule. Higher order derivatives. Extremum problems. Mean value theorem. Applications. Indeterminate forms and L' Hospital's rule. Taylor's and Maclaurin's series. Curve sketching. Integration as the reverse of differentiation, as area, as limit of finite sums. Definite integrals. Properties of definite integrals. Applications.

Code: MTH 102
Credit Unit: 4
Title: Elementary Mathematics II

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems. The course starts at a level, which is appropriate to students who may not come through traditional educational routes.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and confidence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Transcendental functions. Hyperbolic functions. Inverse functions. Logarithmic differentiation. Methods of integration. Integration of rational functions. Integration by substitution. Integration by parts. Improper integrals. Applications. Areas and volumes. Centre of mass. Ordinary differential equations. First-order equations with variables separable. First order linear equation. Second-order homogeneous equations with constant coefficients. Applications. Plane analytic geometry. Rectangular Cartesian co-ordinates. Distance between two points. The straight line. Loci. The circle, parabola, ellipse and hyperbola. Second degree curves. Plane polar co-ordinate systems. Graphs of polar equations. Plane areas in polar coordinates. Vectors. Vector functions and their derivatives. Velocity and acceleration. Matrix algebra. Addition and multiplications. Transpose. Determinants. Inverse of non-singular matrices. Crammer's rule and application to the solution of linear equations, (Examples should be limited to $m \times n$ matrices where $m = 1, 2, 3$, etc). Transformation of the plane. Translation, reflection, rotation, enlargement. Composition of transformations. Invariant points and lines.

Code: CHM 101
Credit Unit: 4
Title: General Chemistry

Rationale:

To provide a background in chemistry for all engineering students to complement their 0- Level knowledge.

Aims:

To ensure that all students have adequate background in chemistry

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the atomic structure of metals.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Atomic structure and the periodic classification of the elements; ionic and covalent bonding including the effect of dipole-dipole interacting of physical properties. Redox reactions and the concept of Oxidation numbers; introduction to gas kinetics; introduction to nuclear chemistry. Solids and lattice structure; acid base reactions; general principles of extraction of metals.

Code: CHM 102

Credit Unit: 4

Title: General Chemistry

Rationale:

To provide a background in chemistry for all engineering students to complement their O-Level knowledge.

Aims:

To ensure that all students have adequate background in chemistry

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the atomic structure of metals.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Physical and chemical equilibrium, elementary electrochemistry and chemical kinetics. Survey of reactions of function group in aliphatic and aromatic compounds. Concept of hybrid bonds. Alkanes, alkenes, alkynes reactions of alcohol and alkyl; halides; addition and elimination reactions of carbon multiple bonds, elimination and substitution in benzene; hydroxyl groups and carbonyl compound, organic acid bases and derivatives.

Code: PHY 101

Credit Unit: 4

Title: General Physics I

Rationale:

To provide a background in Physics for all engineering students to complement their O-Level knowledge and prepare them for circuit analysis.

Aims:

To ensure that all students have adequate background in basic Physics.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the laws of physics.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Mechanics: Space and time units and dimensions; vectors; kinematics, Newton's law; Galileo invariance, statics and dynamics of particles; universal gravitation, work and potential energy, conservation of energy and momentum; rigid bodies; fluid mechanics. Thermal physics: Thermal properties, including elementary thermodynamics and Kinetics Theory.

Code: PHY 102

Credit Unit: 4

Title: General Physics II

Rationale:

To provide a background in Physics for all engineering students to complement their a-Level knowledge and prepare them for circuit analysis.

Aims:

To ensure that all students have adequate background in basic Physics.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the laws of physics.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Electricity and Magnetism: Electrostatics; conductors and currents; dielectrics; magnetic fields and induction; Maxwell's equations; electromagnetic oscillations and waves. Geometrical Optics: Geometrical methods applied to the optics of mirrors, lenses and prisms.

Code: BIO 101

Credit Unit: 3

Title: Biology for Physical Sciences

Rationale:

To provide a good background in Biology of living things for all engineering students to complement their O- Level knowledge and prepare them for circuit analysis.

Aims:

To ensure that all students have adequate background in Biology.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in Biology.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Scientific methods and the characteristics of living and non-living things. Cell and Tissue biology. Elements of biological chemistry and cellular metabolism. Taxonomy of living things, heredity and evolution. Elements of ecology and types of habitats.

Code: GST 101

Credit Unit: 2

Title: The Use of English I

Rationale:

To provide a good communications skill for all engineering students

Aims:

To ensure that all students have adequate communications skills.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in communications skill and be able to read and understand reports.

Assessment:

Test 30% Examination 70%

Content:

Use of Library. Use of words and sentence construction. Functions of sentences purpose structure, correct use of verbs (Action words), word order and punctuation. Essay/Composition Writing. Paragraphs – structure, function, links and style. Exposition description and explanation. Special types of exposition, e.g. letter writing, layout of a business letter, technical reports including terms of reference, drafting and editing of reports.

Code: GST 102

Credit Unit: 2

Title: The Use of English II

Rationale:

To provide a good communications skill for all engineering students

Aims:

To ensure that all students have adequate communications skills.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in communications skill and be able to read and understand reports.

Assessment:

Test 30% Examination 70%

Content:

Comprehension and interpretation reading efficiency of technical and non-technical material. Note taking; techniques of note taking from

reading and from lectures, precise-writing or summarizing methods, technical vocabulary, word formation, use of classical terms and affixes, special terms, acronyms, new words, definitions by example synonym or antonym, analytic or operational definitions, basic words in fields of specialization, e.g. mechanical, electrical, civil, aeronautical, automobile engineering, metallurgy, mathematics.

Code: GST 103
Credit Unit: 1
Title: Humanities

Rationale:

To provide a good understanding of the environment and the various policies of the government as it affects the citizens.

Aim:

To ensure that all students have adequate knowledge of government operations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and participate in the discussions in government activities.

Assessment:

Test 30% Examination 70%

Content:

The nature and the scope of economics. The Nigerian political system: policy and means of production in Nigeria. The structure of the Nigerian economy aspects of economics and technological dualism; internal migration rural to urban migration and the informal sector. The role of capital growth and development; public investment criteria; choice of “Appropriate” or “relevant” technology. Human resources development in Nigeria labour utilization, education and manpower development and planning. Agriculture in the development process; land tenure and reform, Agricultural technology and green revolution and integrated rural development. Industrialization: role and types of industry, choice of techniques, import substitution, and export expansion. The economic

role of the government expenditure and taxation; the federal structure, fiscal federalism and revenue allocation; the financial system, problems of development planning and plan implementation in the federal system of Government, prospects of the Nigerian economy.

Code: GST 108
Credit Unit: 2
Title: Social Sciences

Rationale:

To provide a good understanding of the environment and the various policies of the government as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the public and private sector operations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and participate in the discussions involving the public and private sector activities.

Assessment:

Test 30% Examination 70%

Content:

Introduction: The nature and scope of politics and economics. Definition of basic concept in economics and political science.

Nigeria’s Public Sector: The political set up in Nigeria. The civil service structure, Public investment and economic infrastructure. The economic role of government: government expenditures and revenues, fiscal federalism and revenue allocation.

Nigeria’s Private Sector: The financial system in Nigeria. The role of the agricultural sector in the development process. The Industrial sector and public investment in Nigeria. Human resources development and utilization in Nigeria, National developmental planning-problems and prospects, aspects of economic and technological dualism. Political and Economic future of Nigeria. A global perspective of economics; economic system and developing nations’ economies. International trade and economic development; balance of payments, commercial policies of Nigeria and other developing countries. Economic integration; state

and structure of economies of ECOWAS countries, the ECA and Economics Co-operation in Africa. Foreign aid and investments: The multinational corporations, technological transfer and technological dependence. Global inter dependence and the new international economic order. World economic crisis-energy and OPEC, food storage and armament.

Code: GST 110
Credit Unit: 1
Title: Science, Technology and Society

Rationale:

To provide a good understanding of the environment and the evolution of technology as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the effects of science and technology on man.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of understanding in the various ways innovations and inventions in science and technology has impacted on man.

Assessment:

Test 30% Examination 70%

Content:

The Scientific Evolution of Man Science, need for science, history of science, classifications, 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 reserve in Nigeria. *Key Revolution in Technology* technology, electronics and computer technology, robotics and cybernetics, every day applications; technology history of technological evolution/practice in Nigeria; role of technology in the national economy; *Education for technology* past, present and future; constraints in the use of New technology products reliability, quality control, cost effectiveness, politics and environment; effects of mechanization, consumerism, *Social implication of scientific advances* science in the civilization of man, science and culture, society social of scientific advances e.g. Population

explosion, environmental pollution; Social Implications of technological research and advances E.g., displacement of man by machines, space travels, threat of nuclear and neutron war, genetic research, energy crisis; *Ethics in technology* ethics, professionalism legal aspects.

Code: FRN 101
Credit Unit: 1
Title: Use of French I

Content:

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 such as the articles, verbs, etc.

Code: FRN 102
Credit Unit: 1
Title: Use of French II

Content:

Here the students will be drilled in French grammar proper, dialogue and other oral exercise. The student 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.

Code: IGB 101
Credit Unit: 1
Title: Introduction to Igbo Language

Content:

Introduction to Igbo grammar, composition and comprehension. Mkpruruedemede Igbo (Otografi onwu). Nkejiasusu Igbo. Akaraedemede Nkebiokwu Igbo. Nkebiahiri Igbo. Ahiriokwu Igbo. Udi Ahiriokwu di iche iche. Asusu Igbo dika asusu svo. Nkejiokwu Igbo. Ndaakorita udaume. Udaolu. Ntughari Edemede (Kompozishion). Edemleta. Atumatu okwu. Aghota azaa (Aguoazaa).

Nchikota. Ekwumekwu n'asusu Igbo. Ikwu okwu n'oha. Nsupe n'Igbo. Njem nleghari anya/igba nkiri.

Code: IGB 102
Credit Unit: 1
Title: Introduction to Igbo History, Culture And Literature

Content:

Akuko banyere ndigbo na mmalite ndu ha., Ekele na nsopuru n'ala Igbo. Uzo di iche iche e si enye nsopuru, Ndi Igbo na nnabata ndi obia. Ewumewu ndi Igbo, Ewumewu nkwalite aku na uba. Ewumewu Okpukperechi Ewumewu Ahuike. Ewumewu Okwu Ochichi. Mmekorita Ndi Igbo na ndi agbataobi ha. Akuko okike. Aru. Onwu na ndu. Akwamozu Okwukwe di iche iche ndi Igbo nwere. Agumagu Igbo. Ngalaba agumagu igbo na ejirimara ha. Akparamagwa na uru agumagu onu na agumagu ederede. Njem nleghari anya

Code: GST 201
Credit Unit: 1
Title: Nigerian and African Cultural Development Social Science II

Rationale:

To provide a good understanding of the environment and the various policies of the government as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the public and private sector operations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence and participate in the discussions involving the public and private sector activities.

Assessment:

Test 30% Examination 70%

Content:

Concept and meaning of development; traditional African its geographical and ethnographical review, its family structure, kingship system etc., socio-economic pre-occupation, political system, art and music, modes of communication; Africa and processes of modernization

education, writing and the press, urbanization and social change, modern trends in art and aesthetic, nationalism and cultural revival, mass media and national development.

Code: CSC 201
Credit Unit: 4
Title: Computers and Applications I
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a good understanding of computers and its applications for all engineering students which will enable them to see computer as a basic tool for solving all engineering problems.

Aim:

To introduce students to the constituent parts of computers as well as the use of computers and applications software, the use of High level languages to solve mathematical problems.

Learning Outcomes:

At the end of this course the student will be capable of exploring mathematical software packages and to evaluate their use in engineering analysis.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Introduction to digital computer, their uses and modern programming techniques. Brief history of computers, generation of computers, structure of a general purpose computer general problem solving, systematic development of algorithms, flow diagrams, meaning of logical processes analysis of computational problems coding of programs, verification and validation of programs. Practical experience operating computers, and peripheral equipment. Extensive practice with one or more higher-level language. Emphasis on technical applications. Elementary numerical algorithms.

Code: MTH 202
Credit Unit: 3
Title: Mathematical Methods II
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Vectors. Product of vectors. Equations of lines and planes. Vector spaces. Linear dependence and independence. Basis and dimensions. Linear transformations, matrices. Operations in matrices. Rank of a matrix. Determinants. Inverse of a matrix. Solutions of systems of linear equations. Cramer's rule. Eigenvalues and eigenvectors. Similarity to diagonal matrices. Bilinear and quadratic forms. Applications.

Code: MTH 203
Credit Unit: 3
Title: Elementary Differential Equations
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Derivation of equations from physics, chemistry, biology, geometry 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, methods of undetermined coefficients and variation of parameters. Application of second order linear equations. General theory of n-th order linear equations. Laplace transform. Convolution. Solution of initial-value problems by Laplace transform method. Difference equations.

Code: MTH 211
Credit Unit: 3
Title: Introduction to Statistics and Probability
Pre-requisite: MTH 101 or MTH 102

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Frequency distribution, measures 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 2 applications.

Code: ENS 301
Credit Unit: 2
Title: Introduction to Entrepreneurship and Innovation

Content:

Development, Entrepreneurship. 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.

Code: ENS 302
Credit Unit: 2
Title: Business Creation, Growth and Corporate Governance

Content:

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 scientist/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 plan. Corporate governance and change movement.

**SCHOOL OF ENGINEERING AND ENGINEERING
TECHNOLOGY (SEET) COURSES**

Code: ENG 101
Credit Unit: 1
Title: Workshop Practice I

Rationale:

To provide for all engineering students the knowledge of the various tools used in engineering workshops.

Aims:

To ensure that all students have adequate background in the use of engineering measuring instruments such as calipers etc.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the use of engineering tools and safety precautions in workshops.

Assessment:

Laboratory 40% Test 30% Examination 30%

Content:

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 products layouts, cutting, shaping, simple bend theory etc. **Introduction To Joining Techniques:** soldering, brazing, fusion welding, fastening and assembly. Basic woodworking principles and tools finishing and evaluation of finished products.

Code: ENGI02
Credit Unit: 1
Title: Workshop Practice II

Rationale:

To provide for all engineering students the knowledge of the various tools used in engineering workshops.

Aims:

To ensure that all students have adequate background in the use of engineering measuring instruments such as calipers etc.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the use of engineering tools and safety precautions in workshops.

Assessment:

Laboratory 40% Test 30% Examination 30%

Content:

Industrial Safety: Safety Code of conduct and safety consciousness. Survey of common sources of accidents in the work place. Accident prevention and control.

Machine Shop Work: Working Components in a lathe machine, instructions in simple metal working processes e.g. shaping, milling, grinding, drilling, reaming, metal spinning, design of jigs and fixtures. Introduction of automation in manufacturing visualization fixtures and CAD, automobile work, simple automotive diagnosis and repairs.

Electrical Workshop Practice: Convention and application of colours, codes for cables, resistors etc and signs. Use of simple electrical tools, machines etc.

Code: ENG 103

Credit Unit: 1

Title: Engineering Drawing 1

Rationale:

To provide for all engineering students the knowledge of engineering drawings and projections.

Aims:

To ensure that all students have adequate background in the use of engineering drawings layouts and lettering.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the constructions of various shapes.

Assessment:

Assignments 50%

Examination 50%

Content:

Introduction to Engineering Tools. Planning and layout of Engineering Drawing. Engineering Drawing Concept. Introduction to Dimensioning types; Dimensioning of circles, holes, radio, tolerance. Descriptive Geometry, Freehand sketching.

Introduction to Drawing/Drafting software and CAD basic tools. Orthographic multiview projection. Construction of plane shapes using CAD Construction techniques.

Presentation of data and results using charts, graphs etc by appropriate Computer Software. Further dimensioning, addition of dimensions to drawings using CAD.

Code: ENG 104

Credit Unit: 1

Title: Engineering Drawing II

Rationale:

To provide for all engineering students the knowledge of engineering drawings and projections.

Aims:

To ensure that all students have adequate background in the use of engineering drawings layouts and sectioning.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the constructions of various shapes.

Assessment:

Assignments 50%

Examination 50%

Content:

Connections in Engineering Drawing. Introduction to IS Code of Drawing. Conics and Engineering Curves ellipse, parabola, hyperbola, cycloid, trochoid, involutes. Projection of 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 symbols. Simple assembly drawing with suitable fits and a part list and introduction to limits and tolerances. Screw threads, fasteners and springs including keys and key ways.

Code: ENG201
Credit Unit: 1
Title: Engineering Workshop Practice III
Pre-requisite: ENG 101 or ENG 102

Rationale:

To provide for all engineering students the knowledge of the various tools used in engineering workshops.

Aims:

To ensure that all students have adequate background in the use of engineering measuring instruments such as calipers etc. this course the student will demonstrate a high degree of competence in the use of engineering tools and safety precautions in workshops.

Assessment:

Laboratory 40% Test 30% Examination 30%

Content:

Introduction to Manufacturing Technology, Basic Foundry Technology: Sand testing, mixing of sands, and preparation of moulds. Pattern making solid, spilt, sweep patterns; hoisting 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, Comer Joints (Cap joints etc), soldering, brazing, and 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.

Code: ENG 203
Credit Unit: 1
Title: Engineering Drawing III
Pre-requisite: ENG I03

Rationale:

To provide for all engineering students the knowledge of engineering drawings and projections.

Aims:

To ensure that all students have adequate background in the use of engineering drawings layouts and sectioning.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the constructions of various shapes.

Assessment:

Assignments 50% Examination 50%

Content:

Drawing conventions including weld vents, piping, referencing, and selection of tolerances based on design requirements. Gears, gear drives, and rolling bearings. Pipes/structural drawing. Reading and interpreting complete drawing. Detailed use of CAD for Engineering Drawing, and introduction to AutoCAD.

Code: ENG 206
Credit Unit: 1
Title: Workshop Practice IV
Pre-requisite: ENG 101 or ENG 102

Rationale:

To prepare engineering students in the use of engineering materials to assemble engineering products

Aims:

To ensure that all engineering students have adequate background in the use of foundry, welding machines, to produce simple engineering products.

Learning Outcomes:

At the end of this course the student will be able to know how to produce products to the required tolerance and specification.

Assessment:

Assignment 50% Examination 50%

Content:

Manufacture of simple Engineering and technology products to specification using Machinery, Foundry, Welding and Woodworking Technologies. Introduction to computer aided design/computer aided manufacture (CAD/CAM). Inspection and testing of the manufactured products for accuracy using appropriate equipment and methods.

Code: **ENG 207**

Credit Unit: **2**

Title: **Introduction to Engineering Materials I**

Pre-requisite: **CHM 102 or PHY 102**

Rationale:

To provide for all engineering students the basic knowledge of engineering materials.

Aims:

To ensure that all engineering students have adequate background in the crystal structure of all materials used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of heat on various metals, the effects of imperfections and mechanical properties of metals used in engineering.

Assessment:

Test 30% Examination 70%

Content:

Review of atomic bonding, classification of Engineering Materials (Metals, Ceramics, Polymers, composites, Semi-conductors). Introduction to extractive metallurgy. Elements of crystallography Crystal structures: Lattice unit cells, planes and directions, miller indices, inter planar spacing. Packing of spheres simple cubic, body centered cubic, face centered cubic, hexagonal close packed structures, atomic packing densities, interstitial sites, sizes and their distribution, Lattice imperfections Vacancies, and other point defects, line and surface defects. Phase Equilibria and alloy theory, solid solution. Introductory to heat treatment of steels.

Code: **ENG 208**

Credit Unit: **2**

Title: **Introduction to Engineering Materials II**

Pre-requisite: **CHMI02 or PHYI02**

Rationale:

To provide for all engineering students further knowledge of engineering materials.

Aims:

To ensure that all engineering students have adequate background in the crystal structure of all materials used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of heat on various metals, the effects of imperfections and mechanical properties of metals used in engineering.

Assessment:

Test 30% Examination 70%

Content:

Non-ferrous engineering alloys and their properties. Mechanical properties of engineering materials:

Plastic deformation of a single crystal, stress and strain curves, strain hardening; Creep, toughness and fatigue hardness. Principles of mechanical testing mechanism of ductile brittle transition in fracture and ITT Curves. Physical properties of materials electrical, optical and magnetic properties. Electronic structure and properties. Non-metallic materials. Ceramics, Structures, properties, processions application. Plastic types, structures, processing and applications. Composites types and properties. Wood as an Engineering material. Environmental stability of engineering materials corrosion and corrosion control.

Laboratory: Mechanical testing of materials, ITT determination using charpy, I20cl, Hardness tests, particle sizing and compaction of powders.

Code: ENG 209
Credit Unit: 3
Title: Engineering Thermodynamics

Rationale:

To acquaint engineering students with the laws of thermodynamics.

Aims:

To ensure that all engineering students have adequate background in thermodynamic processes. Learning Outcomes:

At the end of this course the student will be able to know the laws of thermodynamics and be able to apply them in the design of heat engines.

Assessment:

Test 30% Examination 70%

Content:

Fundamental concepts. History of thermodynamics, dimensions, units, system, state property, process, heat, work, pressure, temperature. Zeroth Law.

First law of Thermodynamics: Conservation of energy (Joule's experiment) first law, energy Non-flow process, entropy, steady flow processes. Properties of pure substances, PVT relations and Diagrams, CP, CY, Ideal gas, thermodynamic charts, and tables.

Second Law of Thermodynamics and boat engine cycles Carnot heat engine and cycle. The second law and its corollaries. Entropy: Reversible and irreversible processes. Classics inequality, entropy and irreversibility. Heat engine and heat pump calculations. Applications of 2nd law of non flow and steady flow processes.

Available and unavailable energy, availability Gibbs equations.

Code: ENG 212
Credit Unit: 2
Title: Engineering Economy

Rationale:

To prepare engineering students towards the management of engineering projects.

Aims:

To ensure that all-engineering students have adequate background in the setting up and management of engineering projects as well as making good cost estimates and valuations.

Learning Outcomes:

At the end of this course the student will be able to master economic analysis of alternatives, decision making among alternatives and be able to compute depreciation on engineering materials

Assessment:

Test 30% Examination 70%

Content:

Introduction: The role of Engineering Economic analysis, e.g. engineering economic analysis, the decision making process.

Engineering costs fixed, variable, marginal and average costs, sunk cost, opportunity costs, recurring and non-recurring costs, incremental costs.

Interest and Equivalence: Computing cash flows, time value of money, simple and compound interests, interest formulas, Calculation of equivalence involving interests. Economic analysis of alternatives Basics of comparison (annual equivalent cost comparison, present equivalent cost comparison, incremental approach, rate of return comparisons, benefit/cost comparisons, MARR). Evaluating Replacement alternatives, Break Even analysis.

Accounting and Depreciation: Accounting and cost accounting, application of computer in accounting. Basic aspects of depreciation. Depreciation and expenses. Depreciation accounting methods traditional methods, straight line sum of the year digits and declining balance methods, Modified Accelerated Cost Recovery System (MACRS) Methods. Comparison of MACRS to other depreciation accounting methods.

Income Tax: Income tax rates, calculation of taxable income of individuals and firms. Financial reports/statement of accounts of companies.

Code: ENG 213
Credit Unit: 2
Title: Engineering Mechanics I (Statics)
Pre-requisite: MTH 101, MTH 102 or PHY 101

Rationale:

To introduce students to the statics of particles and rigid bodies in a plane.

Aims:

To introduce all the engineering students to techniques for solving static problems in real life.

Learning Outcomes:

At the end of this course the student will be able to solve real life problems the areas of statics and kinematics.

Assessment:

Test 30% Examination 70%

Content:

Basic concepts in statics. Statics of particles and rigid bodies in a plane; analysis of forces; distributed forces, vectors, flexible cables, motion static and dynamic. Equilibrium of a particle and equilibrium of Rigid body, Areas, Centroids, masses, centres of gravity, analysis of structures; internal forces, Newton's third law, shearing forces, moments, trusses and frames. The basics of free body diagrams. General mathematical principles. Moments of inertia of an area, Computer application and simulations in statics.

Code: ENG 214
Credit Unit: 2
Title: Computer Programming for Engineering Applications
Pre-requisite: MTH 102

Rationale:

To provide a good understanding of computers and its applications for all engineering students which will enable them to see computer as a basic tool for solving all engineering problems,

Aim:

To introduce students to the use of High-level languages to solve mathematical problems.

Learning Outcomes:

At the end of this course the student will be capable of exploring mathematical software packages and to evaluate their use in engineering analysis.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Introduction to C/C ++/JAVA Programming Language. The MAIN () function, Comment lines, Types conversion. Constants, Expressions. The PRINTF Function. The SCANF function. The assignment statement formatted input and output statement. Arithmetic Operators. The IF Statement. Comparison Operators, logical operators. Nested IF ELSE Statements UNARY Operators, TERNARY Operators, Bitwise Operators, Combined Operators, Table of priority of C/C++/JAVA Operators. The WHILE top, to DO WHILE Loop, the FOR Loop Statement, NESTED loops, unconditional program branching. The GO TO statement, the CONTINUE Statement, the BREAK and SWITCH Statement. Application of C/C++/JAVA programming languages in solving engineering problems.

Code: ENG 217
Credit Unit: 1
Title: Science, Technology and Society

Rationale:

To provide a good understanding of the environment and the evolution of technology as it affects the citizens as well as the economic base of the nation.

Aim:

To ensure that all students have adequate knowledge of the effects of science and technology on man.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of understanding in the various ways innovations and inventions in science and technology has impacted on man.

Assessment:

Test 30% Examination 70%

Content:

Science, Technology and Engineering: Definitions, historical development of engineering, science and technology. **The Engineering Family:** The Engineer, the Technologist, the Technician, the Artisans and Craftsmen. **Role of the Engineer in the society:** In Space travel missions, in Oil and Gas production operations, in politics, law, medicine, education, administration, management, food production, utilities, military service, and developing new technologies and products. **Branches of Engineering:** Agricultural Engineering, Aeronautical Engineering, Civil Engineering, Mechanical Engineering, Materials and Metallurgical Engineering, Electrical and Electronic Engineering, Petroleum Engineering, Gas Engineering and Chemical Engineering, etc.

Professional Qualifications: Engineering Education qualifications, registrable as a professional Engineer with: Nigerian Society of Engineers (NSE), Council for the Regulation of Engineering in Nigeria (COREN), Africa Institute of Science and Technology (AIST NIGERIA). Etc, other countries have their own bodies.

Professional Practice: Professional Ethics and Conducts. Professional Registration procedures and Engineering Professional responsibilities. Management skills, project management, developing new technologies, tools, machines, computers, and systems protecting intellectual property rights and business legal rights, handling human and energy resources, fossil, geothermal, nuclear, wind and solar. Conversant with safety in Engineering Practices. Control of occurrences of accidents in Production Industry (Oil, Steel, mining, etc). Rules and regulations guiding pollution of the environment. Capable of applying appropriate technologies, Information and Communication Technology (ICT) systems in Engineering practice. Financial Management knowledge requirement, human relations management essential in developing the Engineer to promote productivity in any enterprise.

Code: ENG 224
Credit Unit: 2
Title: Engineering Mechanics (Dynamics)
Pre-requisite: MTH102 or PHY 101

Rationale:

To introduce students to the Kinetics and kinematics of particles and rigid body motions.

Aims:

To introduce all the engineering students to techniques for solving kinetics problems in real life.

Learning Outcomes:

At the end of this course the student will be able to solve real life problems the areas of kinematics.

Assessment:

Test 30% Examination 70%

Content:

Newtonian principles of dynamics of particles and rigid bodies applied to one-dimensional and two-dimensional motions. Force system resultants, structural analysis, kinematics and kinetics of particles and rigid body motions, methods of impulse and momentum, linear and

angular momentum, work and energy, Relative motion concepts. Computer applications and simulation of engineering mechanics and dynamics.

Laboratory:

Experiments illustrating dynamics of particles and rigid bodies, material elasticity, friction and machines.

Code: ENG 226
Credit Unit: 3
Title: Introduction to Electrical and Electronics Engineering
Pre-requisite: MTH 102 or PHY 102

Rationale:

To provide engineering students with an understanding of the analytical and computational techniques used to solve electric circuit problems and applications. Electrostatic and electromagnetic concepts are introduced to provide for understanding of the field concepts associated with circuits and to explore the problems of electromagnetic interference.

Aims:

To introduce all the engineering students to techniques for solving dc circuit problems and to apply the techniques to practical problems.

To introduce all the engineering students to the concept of digital logic circuits.

Learning Outcomes:

At the end of this course the student will be able to analyse and simulate D.C. and A.C. electrical circuits. Be able to implement simply logic circuits

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Review of electrostatics and electromagnetism. Transient and Steady-State analysis of circuits; network theorems and techniques, passive and active circuits and building blocks, sinusoidal analysis and phasors.

Transformers: Principles and operation.

Electrical Machines: Principles and operation of electrical machines, motors, generators, single and polyphase systems.

Introduction to electronic circuits and models: Conduction mechanisms and applications of diodes, junction transistors, and amplifiers. Introduction to integrated circuit technology and digital circuits.

Laboratory:

Analogue and digital instrumentation and systems, applications of operational amplifiers, associated laboratory experiments.

Code: ENG 301
Credit Unit: 2
Title: Industrial Studies I

Rationale:

To introduce students to the various practices in the industry.

Aims:

To introduce students to the various practices in the industry.

Learning Outcomes:

At the end of this course the student will be able to fit into any industry for industrial attachment.

Assessment:

Test 30% Examination 70%

Content:

Manufacturing Systems Analysis. Types of production; associated layout problems, materials handling and control Network Analysis; arrow diagrams; bar charts. Critical path method, program evaluation and review technique, resource leveling, activity crashing. Modern manufacturing methods, automation, Computer Aided Engineering (CAE) applications, CAD/CAM, Finite Element Analysis (FEA) and Computer Integrated Manufacturing.

Applications: Cost analysis, scheduling, job loading and job sequencing, production planning and control.

Inspection and testing methods, introduction to quality control.

Practice: Group/Individual implementation/ manufacture/ assembly of selected technological products in simulated production environments, construction of physical models of relevant concepts.

Code: ENG 305
Credit Unit: 3
Title: Strength of Materials I
Pre-requisite: ENG 207

Rationale:

To provide for all engineering students the basic knowledge of strength of materials.

Aims:

To ensure that all engineering students have adequate background in the strength of all materials used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of elasticity and stress/strain on materials used in engineering design and construction.

Assessment:

Test 30% Examination 70%

Content:

Elementary concepts in two-dimensional theory of Elasticity, generalized Hook's law, equations of equilibrium, strain-displacement and stress-strain relations. Axial force, shear force and bending moments, simple bending theory, shear and moment diagrams. Torsion; combined bending. Stresses; transformation of stresses. Mohr's circle. Deflection of beams, elementary buckling of column.

Laboratory:

Mechanical testing of members under axial, bending and torsional loads. Deformation and characteristic stress-strain curves; strength, ductility, brittleness loading and unloading.

Code: ENG 307
Credit Unit: 3
Title: Engineering Mathematics I
Pre-requisite: MTH 203

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Review of Ordinary Differential Equations: Bessel, Lagrange's.

Partial differential equations: Engineering applications, Laplace transformations and other transform methods. Series solutions and special functions: such as: Gamma functions, Beta, Gauss functions, Fourier series.

Code: ENG 309
Credit Unit: 3
Title: Fluid Mechanics I

Rationale:

To provide for all engineering students the basic knowledge of behavior of fluids in engineering.

Aims:

To ensure that all engineering students have adequate background in the behavior of fluids in engineering used in engineering designs and fabrications.

Learning Outcomes:

At the end of this course the student will be able to know the effect of elasticity and stress/strain on materials used in engineering design and construction.

Assessment:

Test 30% Examination 70%

Content:

Definition of a fluid and fluid properties. Statics of fluid systems; pressure in a static fluid. Manometry, Forces on Plane and Curved surfaces; Buoyancy and Floatation, stability of Floating and submerged bodies. Kinetics of Fluid motion, Types of flow, Continuity Equation, Momentum Equation, Fluid resistance; Laminar and Turbulent flow in closed conduits: Boundary layer concepts.

Hydraulics of pipe flow; Hydraulic and energy grade lines, pipes in series, parallel pipes. Branching pipes, network of pipes, Deterioration of pipes. Unsteady flow conduits; Water Hammer, Surge Control.

Laboratory:

Measurement of fluid properties, stability of floating bodies, hydrostatic pressure centre of pressure on submerged surfaces, bernoulli equation, friction loss along pipelines, impact of jet.

Code: ENG 308
Credit Unit: 3
Title: Engineering Mathematics II
Pre-requisite: MTH 202 or ENG 307

Rationale:

To provide a further background in mathematics for all engineering students which will enable them to follow technical literature and to apply mathematical analysis to engineering problems at a higher level.

Aims:

To ensure that all students have adequate background in calculus and mathematical manipulations.

Learning Outcomes:

At the end of this course the student will demonstrate a high degree of competence in the mathematical expressions and the techniques of differential and integral calculus, and appreciate the use and role of mathematics in the analysis and design of engineering systems.

Assessment:

Test 30% Examination 70%

Content:

Numerical methods and digital computer methods applied to various engineering problems including matrix inversion, approximation of functions, integration, differentiation ordinary and partial optimization.

Application in engineering. Fast Fourier analysis. Introduction to Optimization e. g. transportation problems, Dynamic programming, Design and stimulation of simple engineering components and applications. Introduction to state space formulation analysis and applications. Monte Carlo simulation.

Code: ENG 313
Credit Unit: 2
Title: Engineering Writing and Presentation

Rationale:

To introduce students to the various practices in the industry.

Aims:

To introduce students to the various practices in the industry.

Learning Outcomes:

At the end of this course the student will be able to be self reliant in developing a product.

Assessment:

Test 30% Examination 70%

Content:

Method and formations involved in and presentation of technical reports. Current technical reports, current techniques in engineering paper presentation, communication schemes, referencing and types of referencing e.g. (Harvard and Vancouver Methods), use of Internet research methods, technical presentation (writing and data collection, organization and presentation), oral presentation of technical ideas, use of audio-visual presentation aids (Multimedia, computer hardware and software applications) etc, use of modern software in presentation, example Microsoft PowerPoint, CorelDraw, Microsoft Word and others.

Code: ENG 405
Credit Unit: 2
Title: Engineering Management and Law

Rationale:

Engineering Management is designed to provide an awareness and introduction to business and management practices.

Aims:

To provide an awareness of the theory and practice of management and the management of human resources in an engineering environment.
 To develop knowledge of business and management practices to meet the demands of the highly competitive engineering industry.
 To develop a knowledge of contract law for engineering projects.

Learning Outcomes:

Demonstrate knowledge of the functions of the manager, the need to provide leadership and motivation, coordination and authority and delegation and define the structure and methods of communications.

Assessment:

Test 30% Examination 70%

Content:

Management:

Organizational structure and behavior, conversion of engineers into managers, managerial functions, principles and techniques of planning forecasting, organizing technical activities, project selection and management. Leadership: styles of leadership and management. Techniques in engineering management, motivation appraisal, participative and control technique, personnel management. Management Information Systems (MIS).

Law:

Engineering profession; professional ethics and conducts, definition and specifications, tenders, bonds, construction forms. Application of business law of engineering; patents, inventions, trademarks, copyright, contracts and contract documents. Engineering business types, the responsibilities professional liability, negligence, arbitration, the engineer as an expert witness. Public work Acts, and Compensation Act.

DEPARTMENT OF ELECTRICAL ELECTRONIC ENGINEERING COURSES (DC)

Code: EEE 202
Credit Unit: 2
Title: Basic Electronic Engineering
Pre-requisite: PHY 102

Rationale:

This course will provide the foundation coverage of electronic devices, and systems from which other units will build.

Aims:

To introduce semiconductor devices and to provide a basic understanding of their use in electronic circuits. To provide an understanding of the electronic principles of amplifiers and transistors.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i. Demonstrate understanding of the operation and characteristics of electronic devices;
- ii. Synthesize and analyse single stage transistor amplifier;
- iii. Demonstrate an understanding of the circuit design of bipolar, MOS and FET transistors.

Assessment:

Lab 20% Test 20% Examination 60%

Content

Thermionic devices: Thermionic, photo and secondary emission; characteristics, parameters and construction of vacuum diodes, triodes, tetrodes, pentodes, gas-filled devices and photocells; applications; cathodes-ray tube construction and operation.

Semiconductor devices: P-N junction diodes formation, characteristics, equation, rating and uses; Description and uses of zener, photo and light

emitting diodes, solar cells, formation and principles of operation of bipoles of operation of bipolar junction transistors (BJTs); Characteristics of BJTs in Common base, Common Emitter, Common Collector configurations; small signal parameters and equivalent circuits; transistor ratings, biasing and graphical analysis operation, characteristics and parameters of junction field effect transistors (JFETs) and metal oxide semiconductor field effect transistors (MOSFETs).

Amplifiers: Classification of amplifiers Class A, B, C, AB and push-pull; thermal stabilization and heat sinks; methods of coupling amplifiers RC-coupled, Transformer coupled, direct coupled, etc; low frequency, mid-frequency and high frequency analysis of single and multi-stage amplifiers using h-parameters or hybrid II model. Power supplies: Types of sources; performance characteristics of half-wave and full-wave rectifier circuit's, voltage stabilization.

Code: **EEE 204**
Credit Unit: **2**
Title: **Digital Logic Techniques and Computer Design I**

Rationale:

To provide students with the necessary skills to analyse and design basic digital systems.

Aims:

To introduce the basic building blocks leading to combinational and sequential logic circuit design.

Learning Outcomes:

At the end of this course, the students shall be able to:

- iv. Design a combinational logic arrangement that uses NAND gates only, using truth tables and K maps.
- v. Design binary counters from a set of timing waveforms
- vi. Design simple memory elements from flip-flops.

Assessment:

Lab 20% Test 20% Examination 60%

Learning Outcomes:

At the end of this course, the students shall be able to:

- i design a combinational logic arrangement that uses NAND gates only, using truth tables and K maps,
- ii design binary counters from a set of timing waveforms.
- iii design simple memory elements from flip-flops

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Binary System: Binary number, numbers conversion, binary addition, subtract, division and multiplication.

Boolean Algebra and Logic Gates: Basic definitions; theorems and properties of Boolean algebra; AND and OR operations; Switching circuits; standard forms of Boolean algebra, and simplification of Boolean functions. The OR, AND and NOT gates; the NAND and NOR gates; practical applications.

Combinational Logic Circuits: network analysis using AND, OR and NOT gates; NAND and NOR gates synthesis, Karnaugh maps;

Applications: encoders, multiplexers, demultiplexers, adders, Random Access Memories (ROMs). Programmable Logic Array (PLAs), etc Flip-Flops, sequential circuits, design procedure and applications.

Codes, Counters, and Registers: BCD and Alphanumerical codes, binary and BCD counters; memory and shift registers; register transfer and buses Signed Numbers and Complementary Arithmetic.

Introduction to microprocessors: basic microcomputer architecture; memory, microprocessor, and applications: I/P and O/P devices.

Code: EEE 206
Credit Unit: 1
Title: Electrical Electronic Engineering Studio I

Code: EEE 301
Credit Unit: 2
Title: Network Theory I
Pre-requisite: ENG 226

Rationale:

To provide students with the necessary skills to analyze network components.

Aims:

To introduce the students to use network components to design filters.

Learning Outcomes:

At the end of this course, the students shall be capable to

- i design all kinds of filters.
- ii perform all sort of network transformations.
- iii analyses two port networks.

Assessment:

Test 30% Examination 70%

Content:

Network components. Network theorems and functions; network topology and transformations. General network solutions; magnetically coupled networks, resonance in networks.

Transform methods in network analysis; single-tuned and doubled tuned circuits. Network functions, two-port parameters, and transfer function signal flow graphs interconnection of two ports; passive and active two-ports networks. Active and Passive filters as examples of two-port networks: design of low-pass, m-derived filters; insertion loss

Code: EEE 302
Credit Unit: 1
Title: Electrical/Electronic Engineering Studio II

Rationale:

Engineering students must be given the opportunity to exercise their engineering abilities to the full and demonstrate that they are ready to become practicing professional engineers.

Aims:

To enable students to show that they can integrate material from all subject areas previously studied on the course.

To allow students to demonstrate the ability to work on group projects.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i demonstrate the ability to use a wide range of skills to solve engineering problems.

Assessment:

Laboratory 50% Examination 50%

Content:

Design and construction of simple domestic and industrial products with emphasis on modularity and use of manufacturers data books. PCB design and fabrication. Study of common electronic components in semi product module. Installation design, planning and execution of electrical/electronic systems.

Code: ECE 302
Credit Unit: 2
Title: Theory of Electronic Instrumentation and Measurement
Pre-requisite: ENG 226

Content:

Measurements in general: methods, errors units, and standards. DC and AC indicating instruments. Principles and applications of potentiometers and bridges.

Electronic instruments. Instruments for the generation and analysis of waveforms. Frequency and time measuring instruments. Transducers and Recorders. Introduction to Digital Instrumentation and Measurements.

Code: **EEE 305**
Credit Unit: **2**
Title: **Electromagnetic Fields and Waves**
Pre-requisite: **ENG 226 and MTH 201**

Rationale:

Electromagnetic concepts are introduced to provide an understanding of the field concepts associated with circuits and to explore the problem of electromagnetic interference.

Aims:

To investigate the electromagnetic field properties of components and interference between circuits.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i Understand the causes of electromagnetic interference in circuits and systems.

Assessment:

Test 30% Examination 70%

Content:

Concise review of the field concept and basic vector analysis; steady electric currents and their magnetic fields. Maxwell's equation; Laplace equation and its solutions (graphical, experimental and analytical). Wave equation and its solution; Poynting's theorem, energy and power; radiation pressure and momentum. Characterization of Media: - Plane waves polarization, reflection, refraction and standing waves. Wave modes in simple guided structures: - TEM, TE and TM modes, propagation constant, and losses. Simple examples of engineering structures for guided waves. Resonators: - introduction. TEM types and cavity type; methods of tuning and coupling. Calculation of Q- factor. Introduction to perturbation theory.

Code: **EEE 306**
Credit Unit: **2**
Title: **Network Theory II**
Content:

Network functions, two-port parameters, and transfer function signal flow graphs; interconnection of two ports; passive and active two-ports networks. Active and Passive filters as examples of two-port networks: design of low-pass, m-derived filters; insertion loss.

Code: **EEE307**

Credit Unit: **2**

Title: **Engineering Control Systems Analysis and Design I**

Rationale:

The subject of control is crucial importance in the physical implementation of automatic control system, and systems used in the logging of the physical performance of processes and plant.

Aims:

To gain an understanding whereby typical control systems can be designed so that their performance can be maintained within defined boundaries.

To introduce modeling techniques whereby control systems can be analyzed.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i. Analyze various types of control systems and to develop associated equations using frequency response methods.
- ii To predict the overall response of various types of control systems i.e. steady state and transient responses.
- iii Understand the methods whereby transducers are calibrated and specified and to select transducers for various applications.

Assessment:

Test 30% Examination 70%

Content:

Basic concepts and history of control and control systems.

Mathematical models of control components/systems such as servomotors, valves, transducers, error detectors, electrical systems, thermal systems, pneumatic systems.

Derivation of transfer functions:- Open and closed loop control systems; block diagrams and signal flow graphs; transient and steady state response; performance specifications. Stability Analysis: Routh Hurwitz and Nyquist criteria. The Root locus method of analysis and design; Frequency response methods of analysis and design. Bode and Polar plots, gain and phase margins. Nichols Charts.

Introduction to Time Domain Analysis and Design of Control Systems: use of state variables, state-space equations and models. Compensation techniques. Analogue and digital simulation of physical systems. Laboratory study of classical control systems. Use of electrical electronic instruments to study components and systems. Parameters and performance.

Code: EEE 311

Credit Unit: 2

Title: Computer Organization and Architecture

Pre-requisite: EEE 204

Rationale:

Computers form an essential tool to be used by engineers particularly in control systems.

Aims:

To provide students with the understanding of the internal operations of computer systems both hardware and software.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i Become aware of the main developments in computer architecture and will understand modern computer systems.

Assessment:

Test 30% Examination 70%

Content:

Review of the evolution of computers. The organization of a simple digital computer: stored programme concept, data representation; instruction format; addressing modes; instruction sets; arithmetic operations, parallel processing.

Memory Unit: random access, memory hierarchy and methods of direct access. I/O devices and their characteristics. The control Unit: hardware control micro-programmed control.

The Input and Output Unit: I/O buses, I/O interfaces. Application. The Arithmetic Unit.

Code: PSE312

Credit Unit: 3

Title: Electrical Power and Machines

Content:

Introduction to power systems: economics of energy distribution load pattern and prediction, types of transmission and distribution systems. Thermal and hydro' power plants.

Load Flow: Network simplification calculations of simple transmission and distribution networks. Faults: causes, effects and location.

Switchgear: Principles and functions.

Protection and stability, requirements, current and voltage level protection; steady and transient state stability. Magnetic circuits, prediction of hysteresis, eddy current and skin effect losses in machine parts. DC Machine: Windings, generator and motor characteristics

Transformers: Types, equivalent circuits, single phase, three-phase, open circuit and short circuits tests. AC Machines: AC generators construction and operation; polyphase induction motors; synchronous machines construction, types and applications.

Laboratory: Experiments on the characteristics of the series shunt and compound dc generator. Non-load, blocked rotor test on three-phase synchronous machines. Cable fault localization.

Code: ECE316
Credit Unit: 3
Title: Applied Electronics
Pre-requisite: EEE 202

Content:

Oscillators: Feedback principles and circuits; feedback and negative resistance. Oscillators; phase-shift. Wien-bridge, Hartley, Colpitts and Crystal Oscillation conditions for oscillation; Frequency stability; Multivibrators bistable, astable and monostable; Clocked flip-flops and Schmitt trigger; Applications of multivibrators as memory devices, clocks, counters (up/down), and shift registers. Integrated Circuits: Planner structure and fabrication processes for discrete device, monolithic and hybrid ICs, thin film and thick film circuits; printed circuits design and fabrication; Typical linear and digital ICs; their properties and applications; assembly and packaging considerations. Operational amplifiers: Characteristics; Analysis and design:

Thyristor: Silicon controlled rectifiers (SCRs), triacs and diacs, their theory of operation and characteristics; Applications.

Code: COE 318
Credit Unit: 3
Title: Principles of Electronic Communications

Content:

General definitions and units; Principles and history of communications; International Regulations on frequency allocations and bands used in various applications in electronic communications.

Modulation Techniques in Communications AM, FM, PM and Keying Techniques OOK, PSK and ASK. Principles of AM, FM, PM spectral analysis and bandwidths. Modulators and detectors/discriminators for AM and FM signals. Digital and Pulse modulation techniques PAM, PDM, PWM and PCM.

Radiowave propagations: Ground wave, troposphere and ionospheres wave propagation, line of sight (LO-S) propagation. Estimation of field strength.

Antennas: Isotropic antenna and elementary dipole. Near and far fields. Antenna parameters and directional properties. Half wave antennas, standing wave and traveling wave antennas. Practical antennas loop, horn, parabolic etc. Antenna arrays broadside, endfire, yagi, HF, VHF and SHF antennas.

Code: EEE 401
Credit Unit: 3
Title: Microprocessor/Microcomputer Systems and Applications
Pre-requisite: EEE 311

Rationale:

To provide a knowledge of microprocessors to form the foundation for computer engineering.

Aims:

To focus on the role of microprocessor hardware and software as a means of achieving the solution of engineering problems, and to understand the techniques employed in the interfacing of peripheral devices to a microprocessor system.

Learning Outcomes:

At the end of this course the student will be able to:

- i. solve engineering problems using microprocessors, involving hardware and software.
- ii. use a development system and have detailed knowledge of at least one microprocessor.

Assessment:

Laboratory 20% Test 20% Examination 60%

Content:

Review of microprocessor history, comparison of large and small computers. Microprocessor Architecture and System, components of the

microprocessors, process registers, stacks instruction handling areas, basic components (software and hardware) of a microprocessor system (microcomputer); other specific features. A typical microprocessor device (the 8085Amicroprocessor) will be selected and its instruction used for hands-on experience, software development procedures for microprocessor: problem definitions, program design, coding and debugging, testing and documentation. Review of Microcomputer memory sections: simple memory types (RAM, ROM), features of memory interface to microprocessors, busing structures; design of tri-state memory sections etc. Microprocessor I/O sections and I/O design for specific processors. Microprocessor interrupt systems and their characteristics,

Direct Memory Access (DMA) and interrupt systems for specific processors. Applications: monitoring and control functions.

Code: **EEE 405**

Credit Unit: **2**

Title: **Process Control Technology**

Rationale:

The subject of control is crucial importance in the physical implementation of automatic control system, and systems used in the logging of the physical performance of processes and plant.

Aims:

To gain an understanding whereby typical control systems can be designed so that their performance can be maintained within defined boundaries.

To introduce modeling techniques whereby control systems can be analyzed.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i. Analyze various types of control systems and to develop associated equations using frequency response methods.

- ii To predict the overall response of various types of control systems i.e. steady state and transient responses.

- iii Understand the methods whereby transducers are calibrated and specified and to select transducers for various applications.

Assessment:

Test 30% Examination 70%

Content:

Definition and elements of process control

Process Control Devices: characteristics and principles of operation of various thermal transducers, optical transducers, mechanical transducers.

Comparison of analogue and digital processing; Analogue and signal conditioning.

Evaluation of process control. System evaluation criteria, dynamic response evaluation process control loop stability from simple, single variable analogue loops interactive digitally controlled processes. Applications: microprocessor control techniques.

Code: **EEE 407**

Credit Unit: **2**

Title: **Introduction to Linear System Theory**

Pre-requisite: **ENG 308**

Rationale:

To provide a further background in applying mathematical analysis to communications engineering students.

Aims:

To introduce the students to mathematical software and the use of High Level languages to solve mathematical problems.

Learning Outcomes:

At the end of this course the student will appreciate the role of mathematics in the analysis and design of engineering system. Also be

capable of exploring mathematical software packages and to evaluate their use in engineering analysis.

Assessment:

Test 30% Examination 70%

Content:

Brief review of linear algebra; eigen spaces and vector space; vector differential equation. Adjoint systems, the transition matrix. State space theory and analysis for linear dynamic systems; equivalent systems. Observability and state reconstructability; stability and reachability.

Polynomial algebra; the system matrix; introduction to Lyapunov stability theory; Control of multivariable systems.

Applications to feedback control, network synthesis, communications and signal processing.

Code: **EEE 409**

Credit Unit: **2**

Title: **Electrical Engineering Analysis IV**

Pre-requisite: **ENG308**

Rationale:

To provide a further background in applying mathematical analysis to engineering problems.

Aims:

To introduce the students to mathematical software and the use of High Level languages to solve mathematical problems.

Learning Outcomes:

At the end of this course the student will appreciate the role of mathematics in the analysis and design of engineering system. Also be capable of exploring mathematical software packages and to evaluate their use in engineering analysis.

Assessment:

Test 30% Examination 70%

Content:

Special topics in engineering analysis, equations and modeling techniques arising in electrical and electronic engineering practice, including special mathematical techniques for antenna synthesis, forecasting in communications and electrical power systems engineering; system control, random signal selection and advanced circuit synthesis, Applications of microprocessors in filter design, modem telephone switching, electrical power systems.

Code: **EEE 501**

Credit Unit: **3**

Title: **Engineering Control Systems Analysis and Design II**

Pre-requisite: **EEE 307**

Rationale:

The subject of control is crucial importance in the physical implementation of automatic control system, and systems used in the logging of the physical performance of processes and plant.

Aims:

To gain an understanding whereby typical control systems can be designed so that their performance can be maintained within defined boundaries.

To introduce modeling techniques whereby control systems can be analyzed.

Learning Outcomes:

At the end of this course, the students shall be able to:

- i Analyze various types of control systems and to develop associated equations using frequency response methods.
- ii To predict the overall response of various types of control systems i.e. steady state and transient responses.
- iii Understand the methods whereby transducers are calibrated and specified and to select transducers for various applications.

Assessment:

Test 30% Examination 70%

Content:

Review of frequency analysis and the Root-Locus method; Analysis of sampled data systems; electrical control of voltage, current etc, mechanical control of position and speed; realization of compensation networks.

Z-transformation and modified Z-transformation; State-space analysis of control system; the transition matrix; controllability and observability).

On-line computer control, derivation of digital control algorithms; Microprocessor applications. Describing function principles; Phase plane principles; Lyapunov functions; Lyapunov's method of stability analysis; stability regions for sample non-linear systems.

Elective 1**EEE 403 - (DC) PRINCIPLES OF ENERGY PROCESS (1,1,0)**

Theory of energy conversion, transmission and storage methods. Global energy problem.

Fuel cells, their processes and utilizations; Hydrogen production and storage: electrolytic, chemical, thermalytic and photolytic hydrogen storage; photoelectric converters, photo-thermo voltaic converters, heat engines. Biomass and tidal waves. New energy sources; solar energy, flat plate design, economics of solar energy equipment and operation; windmill, tidal water plant, geothermal energy etc. Introduction to nuclear reactors, safety and environmental limited.

Elective 2**EEE 502 - (DC) MICROWAVE COMPONENTS AND MEASURING TECHNIQUES (2,1,0)**

Basic concepts and theory of microwave circuits; general survey of passive, reciprocal and non-reciprocal components; waveguides and resonators. Equivalent circuits, impedance matrix and scattering matrix representations. Transmission matrix and elements of impedance matching. Simple treatment of filters, directional couples couplers, ferrite components and periodic structures.

Simple measurements of microwave power, attenuation, impedance, insertion loss. Q-factor and noise. Use of Smith Chart. Modern trends in microwave measurements; enhanced measurement accuracies, specific measurement techniques, influence of modern technologies.

Elective 3**EEE 504 - (DC) COMPUTER NETWORKS (2,1,0)**

Pre-requisite: EEE 401

Overview. Resource sharing principles and concepts of packet-switching. Packet-switching networks, e.g. the Arpanet, telnet, etc. Fundamental tools; - queuing and network flows.

Performance of teleprocessing systems; principles of network design network performance evaluation, and performances measurements. Deadlocks, degradations and lessons; Protocols for multi-access communications; satellite and ground radio packet switching; Local network architectures; new network services; future trends.

Elective 4**EEE506 - (DC) INTRODUCTION TO OPTIMAL CONTROL (2,1,0)**

Optimal control problems; static versus dynamic optimal control; performance indices, optimal control of continuous systems, optimality. Mathematical programming approach to static optimal control, linear programming, etc.

Calculus of variation, Hamilton Jacobi theory, Pontryagin's maximum principle; Optimal control of linear plants.

Computational techniques and applications.

COMMUNICATIONS ENGINEERING OPTION

Several courses in Communications Engineering with codes **COE** are designed for students that want to major in communications engineering option.

Rationale:

Modern society is totally reliant on communications systems for their operations. The design, installation and maintenance of communication systems is thus an essential part of the society and for these there is an increasing demand for engineers with the appropriate knowledge and skill. Communications Engineers therefore need an appreciation of the principles of information theory and the physical factors affecting the transmission of analogue and digital signals.

Aims:

To introduce the fundamental principles of communications systems. To develop the students appreciation of information theory.

To foster an understanding of the design of communications hardware.

To equip students with the ability to analyze communications systems to a specified performance level.

To develop an understanding of current communications systems so that students may easily upgrade their knowledge to later technologies and techniques when these are introduced.

Learning Outcomes:

At the end of this course, the students will be able to:

- i recognize the duality between the time and frequency domains.
- ii relate the fundamental characteristics of bandwidth, noise and signal power to the quantity of information to be transferred.
- iii appreciate the different qualities of various transmissions.

- iv appreciates the necessity for coding for error protection.
- v have an understanding of satellite and microwave relay systems.
- vi calculate detailed signal to noise ratios throughout line and radio system.
- vii design systems to a given specification from standard units of known performance.

Main Teaching and Learning Activities

Lectures will be used to introduce concepts with tutorial work to develop familiarity. The programme will be supported by supervised laboratory sessions where practical aspects of the subject will be experienced.

Assessment:

Laboratory 20% Test 20% Examination 60%

Code: COE 405

Credit Unit: 2

Title: Fields and Waves in Communications.

Pre-requisite: EEE 305

Content:

Plane Waves Polarization, reflection, refraction and Standing waves. Wave modes in simple guided structures TEM, TE, TM modes, propagation constant and losses. Simple examples of engineering structures for guided waves.

Introduction to Resonators: TEM types and cavity types, methods of tuning and coupling.

Transmission Lines: Types of lines in use. Analysis of uniform transmission lines generalized voltage and current relationships. Impedance transformation; Smith Chart; impedance matching with reactive elements, double and triple stub matching; quarter wave transformers; Transmission line analogy of wave guiding systems; practical waveguide structures; Applications of different types of lines.

Code: COE 407
Credit Unit: 2
Title: Modern Telephony
Content:

History and evolution of telephony.

Telephone and Switching systems: - the telephone instrument characteristics, sensitivity, distortion, side tone; Strowger, Crossbar and Electronic switches; PABX, multi-exchange systems; linked numbering, national network, subscriber trunk dialing, Signaling Transmission standards.

Telephone Traffic Theory: The Earlang distribution, full availability and gradings; traffic-volume, intensity, busy-hour, congestion and grade of service (gos).

Introduction to Mobile Telephony. CDMA and GSM wireless concepts in telephony. Channel allocations, Switching and Handover in mobile telephony. Cell planning and Roaming. Telephone services and distribution in Nigeria.

Code: COE 411
Credit Unit: 3
Title: Communications I
Pre-requisite: COE318

Content:

Review of Digital and Pulse communication techniques. Sampling theory and practice. Compound modulation and multiplexing techniques. FDM and TDM techniques. Comparison of TDM and FDM.

Information Theory: Entropy and information, entropy rate, mutual information and redundancy. Bayes rule, Hartley Shannon theory of communications for memoryless sources and channels.

Decision Theory: Probabilities of error and correct decision procedure. Binary Symmetric Channel (BSC) and Binary Erasure Channel (BEC) calculations.

Effect of noise in communication systems: Noise in AM and FM signals. CW and pulse modulation systems. Detection in additive white Guassian noise, Coherent and non-coherent detection.

Code: COE 413
Credit Unit: 1
Title: Communications Studio I
Pre-requisite: COE 318

Content:

Use of manufacturer data sheets and catalogues; products selection procedure; principles of sound an practical design and construction of communications products.

Design and construction of various devices/components/subsystems for communications. Examples to include AM/FM modulators and demodulators, basic transmitters and receivers.

Code: COE 501/502
Credit Unit: 3/3
Title: Project 1 & II

Content:

Independent individual or group student project under the direction of a staff, involving laboratory experimentation, design, construction and testing of communication components or systems or directed reading in current engineering practice.

Project is to be completed and a written technical report submitted at the end. A viva-voce examination will normally be conducted in order to help assess the student performance.

Code: COE 503
Credit Unit: 2
Title: Communications Engineering Studio II
Pre-requisite: COE411

Content:
Continuation of COE 413. Design, construction, testing and installation of appropriate communication package for an organization. Monitoring and testing on communications systems. Communication systems and circuits protection procedures.

Code: COE 504
Credit Unit: 3
Title: Microwave Communication Systems

Content:
Review of Available frequency bands for Microwave communications.
Route and Site Selection: - site considerations, influences of terrain and obstructions on the choice of microwave path; atmospheric effects on microwave beam. Influence of weather and objects in azimuth. Clearance and path profile representations and calculations. Fresnel zone and Fresnel zone ellipsoids. Software approach in determining Fresnel zones and antenna heights.
Interference co-ordination in microwave systems.
Equipment selection for microwave systems radio equipment, RF combiners, towers, waveguides, antenna systems, radomes, repeaters and links.
Satellite Communications System: Types, Overview of the technology. Path-loss calculations. Access and modulation techniques, techniques for expanding capabilities, present and future frequency use, earth-station technology. Design and losses calculations. ITV recommendations. VSAT networks and Direct Broadcast Satellites (DBS).
System reliability estimates: - reliability with respect to multipath non-selective fading, equipment reliability considerations.

Code: COE 505
Credit Unit: 3
Title: Optical Transmission Systems

Content:
Types of optical fibre transmission systems: Multi mode and single mode fibre cables and their characteristics. Elements of a fibre transmission networks. Comparison of the link performance, capacity, system design and cost-effectiveness. Optical switches. Synchronous Optical Networks (SONET). Wavelength Division Multiplexing (WDM) network elements and components. Fibre to the Premises (FTTP) and Passive Optical Networks (PONs) configurations.
Nigerian communications systems and services:- historical development, critical appraisal; Future trends.

Code: COE 506
Credit Unit: 3
Title: Communications Network Planning and Management

Content:
Definitions and types of network configurations. Types of network planning and planning process; strategic planning, routing, numbering, charging and transmission planning. Long term and short term planning. Network design optimization. Network traffic management principles. Network management types. Network management architecture and protocols. ISO Network management models – SNMP.

Code: COE 507
Credit Unit: 2
Title: Seminars and Industrial Visits

Content:

Each student will be required to present a seminar on an approved topic (analytical/experimental) in communications engineering technology. Industrial visits to communications engineering establishment and allied industries and firms will be made and the student's participation in and knowledge acquired in these visits assessed on the basis of written reports submitted by the student.

Code: COE 508

Credit Unit: 3

Title: Principles of Radar and Navigation Systems

Content:

History of Radar Development. Radar Application, radar frequencies. Radar Equation; radar range, cross section of a target, transmitter power, Antenna parameters, minimum detectable signal, noise. Radar Systems: CW, Doppler, moving-target indication (MTI); tracking radar, laser radar systems.

Navigation Systems: airborne direction finder, air-traffic control radar beacon, instrument low-approach system, and microwave-landing systems.

Code: COE 509

Credit Unit: 2

Title: Principles of Radio and TV Broadcasting

Pre-requisite: COE 318

Content:

Sound wave: Definitions, propagation and characteristics, measurements, speech and communications. Hearing and Loudness.

Transducers: - types, principles of operation, frequency of microphones and loudspeakers; electro acoustical and electromechanical analogies.

Networks and enclosures for loudspeakers. Noise meters.

Acoustics of building: - reverberation, time diffusion and free-field considerations. Noise absorption and insulation.

Components of broadcasting systems: Broadcasting studio and studio equipment. Analogue and digital recording and reproduction systems.

Radio broadcasting and reception systems: AM, FM, TRF and Superheterodyne receiver and other receivers.

Principles of Television: The video signal waveform. Elements of television systems. TV camera types. TV transmission standards (HDTV) and reception.

Recording and reproduction systems.

Sound studio and studio equipment; disc recording and reproduction; stereophony and turntables; other forms of recording and reproduction; frequency response and noise performance of studio and commercial systems.

Noise and Vibration:- types, characteristics and measurements, anechoic chambers. International recommendations for Radio and TV commercial broadcasting.

Code: COE 510

Credit Unit: 3

Title: Quality and Maintenance of Communication Systems

Content:

Quality control, functions of quality control and relationship to production, engineering purchasing and sales. Effectiveness of quality control, sampling plans and procedures.

Control charts and confidence limits. Applications to practical communications systems. Application of reliability concepts to communications engineering system design; Environmental effects; component modes of failure and system reliability; typical failure distributions; Design analysis of failure and system reliability; typical failure distributions. Design analysis of failure and life-time.

Case studies of Nigerian Communications systems.

Maintenance: types. Maintenance planning, frequency and intensity of inspection, optimal replacement/overhaul maintenance policy of equipment. Equipment replacement conditions. System design for ease of maintenance. Documentation requirements. Maintenance instruments requirements. Application to typical communications networks and equipment.

Code: COE 512
Credit Unit: 3
Title: Special Topics in Communications Engineering Technology

Content:

Lectures on selected and relevant topics from recent advances in communications engineering technology.

Code: COE 513
Credit Unit: 3
Title: Data Communications

Content:

Data communication-links: channels, media and configurations. Transmission over voice-grade circuits; design considerations. ITU recommendations, Modulation techniques and modems interconnections and data encryption. Methods of enhancing channel capacity, packet-switching data networks. Multiplexing and synchronization techniques; organization of international and national digital networks requirements. Interfacing, protocols, information codes, error correction for data communication.

Internet: Definition, Network Access Points (NAPs). Internet access. Transmission Control Protocols/Internet protocol (TCP/IP). Internet Virtual Private Networks, IP addressing.

Routers and Routing Information Protocol (RIP)

Routing Algorithms: Shortest path routing e.g. OSPF, Distance Vector Routing, Multiprotocol Label Switching (MPLS).

Next generation Ethernet: Wi Fi and Wireless LANs, Wide Area Wireless Networks, Wimax and Broadband Access for data. WAN/LAN Bridges and Switches. Asynchronous Transfer Mode Network (ATM) structure. Practical data communications systems.

Course Code: COE 514
Credit Unit: 3
Title: Communications Antenna and Measurements

Overview of the development of antennas, antennas for high and microwave frequencies. Analysis and design of reflector antennas. Introduction to the theory of diffraction. Horn feeds. Antennas measurements: pattern, gain measurements.

Elective I

COE 409 – Introduction to Underwater Sonics (1,1,0)

Pre-requisites: EEE 301, EEE 305

Distributed Parameter systems analysis: Wave generation, propagation and detection. Application to transmission media and waves in liquids and solids.

Sonic principles applied to engineering problems; transmission types and levels; noise and reverberation effects. Analysis of underwater instrumentation systems with emphasis on sensing, calibration techniques etc.

Elective 2

COE 511 Digital Filtering & Signal Processing (2, 1, 0)

Pre-requisites: EEE 313, EEE 409

Discrete-time signals and systems. An introduction to digital filtering techniques and computer-implemented processing.

The Z-transform, digital pulse excitation; convolution; sampling theory; delta function; Z-plane poles and zeroes Digital Fourier transforms; FFT algorithms; digital filter techniques; digital Wiener filters; random

signals and spectral analysis. Power densities, auto and cross-correlation functions; quantization theory; analogue-digital (A/D) conversion.

ELECTRONIC AND COMPUTER ENGINEERING OPTION

Several Courses in Electronics and Computer Engineering with codes **ECE** are designed for students that want to major in electronic and computer engineering option.

Rationale:

The study of electronic devices and systems is fundamental to electrical, electronic and computer engineering. It is becoming increasingly important for engineering students to have a more profound knowledge of electronics to be able to understand the operation of new devices of today and to invent those of tomorrow. Today, computers form an essential tool to be used by engineers particularly in control systems.

Aims:

To introduce semiconductor devices and to provide a basic understanding of their use in electronic circuits.

To gain a deep knowledge of modern electronic devices and an understanding of how they are applied.

To introduce measurement techniques for use with electronic instruments.

To introduce the concept of computer aided design as a base for future use.

To use appropriate software packages to test and simulate digital systems.

To provide students with an understanding of the internal operations of computer systems, both hardware and software.

Learning Outcomes:

At the end of this course, the students will be able to:

- i understand and apply modern theories of semi-conductors and novel semiconductor devices.

- ii design efficient I/O mechanisms for computers used in control systems.
- iii design real-time embedded computer system.
- iv design a digital system to perform required functions based on the given specification;
- v enhance the design procedure by the use of appropriate software packages.
- vi design and develop customized software packages for small scale industries.
- vii design systems to a given specification from standard units of known performance.

Main Teaching and Learning Activities

Lectures will be used to introduce concepts with tutorial work to develop familiarity. The programme will be supported by supervised laboratory sessions where practical aspects of the subject will be experienced.

Assessment:

Laboratory 20% Test 20% Examination 60%

Code: ECE 405
Credit Unit: 2
Title: Semiconductor Devices Technology
Pre-requisite: ECE 316

Content:

Review of physics of semiconductors. Principles and 1st order models of semiconductor devices. Semiconductor design technology: semicustom, full custom, wafers and VLSI design etc.

Semiconductor fabrication processes: oxidation, ion implantation, etching, CCD and MOS, lithography, etc Applications. Current trends in solid state devices development and applications – Integrated digital and linear gates circuit. Integrated optoelectronic devices, heterogumating transistors and future technologies of silicon – based devices.

Code: ECE 407
Credit Unit: 2
Title: File and Database Systems Management

Content:

Design and Analysis of Algorithms. Information Storage and Retrievals Record classification and file organization; file searches Indexing, Physical sequential, etc. On-line Information Service Data bank sharing, Query formulation and Systems.

Database Management Logical Design, physical design models, survey of languages. Data description Languages (DDL), Data Manipulation Language (DML), and Report writers.

Database Machines. Database Administration, data dictionary, directory, logging, backup and recovery. Introduction to system analysis and design, as a method for system development. Data – Services, characteristics, organization, manipulations and maintenance/managements (Data warehousing and data mining processes). Data processing cycle, Data disaster, Recovery and Risk mitigation/management. Software acquisitions, procedures and management –upgrades, e-office, social impacts and protections. Essential reasons in the use of files and database systems.

Code: ECE409
Credit Unit: 2
Title: Introduction to Compiler Design and Construction

Content:

General Compiling Principles: Compiler Overview: features, structure, diagnostic tools, multi-pass compilers etc.

Context-free Languages: Arithmetic expressions top-down passing, LR passing.

Translation grammars: processing micro-language, formalisms, implementing a translation grammar button.

Simple Micro-language (C/C++) Compiler: Assignment, Control structures, I/O features. Diagnostic Tools: cross-reference map, dumping program variables, execution profile.

Code: ECE 411
Credit Unit: 3
Title: Advance Electronics 1
Pre-requisite: ECE 316

Content:

Principles of operations, design consideration and applications of solid state devices.

Diodes – PIN, varacter, zener, tunnel, Impatt, Parritt

Waveshaping circuits and applications -

Linear, pulse, wideband Amplifier, clipping, clamping, comparator, snitching and logic circuits.

Sensors operation and applications – Physical Parameters and measurement schemes, integrating sensors in system – Public Address, Telephone, Radio Television, preserver Metrology, fibre optic, radio, medium, telemetry, automotive etc.

Studio – Practical, works on OP AMP

Application, serial/parallel port studio exercises. Minor software development exercise in low-level languages. Java, Visual BASIC, Open sources operating systems.

Code: ECE 501
Credit Unit: 3
Title: Advanced Computer Techniques
Pre-requisite: EEE 401, ECE 407

Content:

Brief review of computer systems using various technical models, block diagrams, types, functions, and general applications for each of the major classifications namely Digital, analog and hybrid computer systems.

Software development: procedures, testing and debugging techniques.

Study of computer testing instruments: -logic comparators, logic analyzers, microcomputer emulator, data latch, signature analyzers etc.

Hardware development and testing techniques: Component repair techniques; organization service policies, computer bus standards serial, parallel, IEEE 488, etc. computer system security and safeguard measure.

Documentation needs: Logic and timing diagrams, truth tables, SOP and POS techniques, work descriptions, listing, flowcharts, failure mode analysis signature table.

Code: ECE 502

Credit Unit: 3

Title: Advanced Electronics II

Content:

Microwave amplifier and oscillators, frequency multipliers, switches, detector and mixer circuits.

Brief treatment of electron dynamics: electron beam, space charge and klystron waves. Travelling Wave Tubes (TWT) and Traveling Wave Tube Amplifiers (TWTA) and applications. Klystrons and magnetrons etc and their applications,

Trends in microwave device and sources development.

Code: ECE 503/504

Credit Unit: 3/3

Title: Project I & II

Content:

Investigation of a suitable topic in Electronics and Computer Engineering Technology involving literature survey, design, computer techniques and construction etc under the direction of a staff.

Continuation and conclusion of ECE 503 and the presentation of a written technical report. The student will then undergo an oral examination.

Code: ECE 505

Credit Unit: 2

Title: Electronics and Computer Engineering Laboratory

Content:

Extensions of ECE 401. Design, construction, testing and installation of various electronic products. Use of manufacturers data sheets and catalogues. Design and construction of various electronic and computer based devices or subsystems. Computer servicing and diagnostics: System failure, isolation techniques, modular checks, component level checks, software package diagnostic test using workbench network packet Tracer, MATLAB, SPICE etc. Computer Assembling: Formatting of an Assembled system and booting procedures. Networking installations and procedures: Identifying the accessories, terminating of cables with interfaces, interface standards and protocol policies. Graphic design using coral draws, and auto CAD exercising to be grown after the study.

Code: ECE 506

Credit Unit: 2

Title: Computer Applications Laboratory

Content:

Hands-on experience on real-time design and applications of mini/and microcomputers and specific microprocessors. Software engineering and design. Network Management System: Design procedure and application. Network Security: Design, procedures and application for both standard alone and global network systems. Students are expected to develop packages in the above stated relevant are as using appropriate languages.

Code: ECE 507
Credit Unit: 2
Title: Seminars and Industrial Visits

Content:

Each student will be required to present a seminar on an approved topic in electronics and computer engineering technology. Industrial visits to appropriate establishments will be made and the student participation in and knowledge acquired in these visits assessed on the basis of written report submitted by the student.

Code: ECE 508
Credit Unit: 3
Title: Digital Instrumentation
Pre-requisite: ECE 302

Content:

Digital measuring system: digital voltmeter, digital frequency meter, automatic bridges etc. Factors influencing performance. Techniques for enhancing overall system performance. Automatic test equipment: current techniques and systems; use of computers and microprocessors' instrumentation systems; data logging. Digital signal analysis techniques. Design analysis and construction of transfer function analyzers. Precision operational amplifiers.

Code: ECE 509
Credit Unit: 3
Title: Industrial Electronics

Content:

Principles, design and construction of power rectifiers and their applications in power circuits; rectification and smoothing techniques; voltage and current regulation and regulator circuits; The thyristor or SCR and its applications: timing, motor speed control. The characteristics and limitations of power transistors at high currents and voltages; design of triacs, quadracs and other power devices. High power microwave generators. Applications. Opto-electronics – photoconduction cells, solar cells, L.E.D, L.C.D and LASER. Noise in electronic circuits: types, signal – to- noise ratio, noise figure. Analog and liquid computer applications: Analogue simulation of engineering systems; linear and non-linear applications, ADC, DAC and computer aided drafting of analog diagram.

Code: ECE 510
Credit Unit: 3
Title: Reliability and Quality Assurance in Electronics

Content:

Introduction to the concept of reliability in electronics. Designing for reliability, testability. Pre-and post manufacturing. Bum-in and firm-wave quality assurance. MTBF concept. Product reliability and prediction. Software reliability.

Code: ECE 512
Credit Unit: 3
Title: Special Topics in Electronics and Computer Engineering

Content:

Lectures on selected and relevant topics from recent advances in electronics and computer engineering.

Code: ECE 514
Credit Unit: 3
Title: Introduction to VLSI System

Content:

Principles of large-scale nMOS design: stick diagramming; nMOS transistors; switch and gate logics; programmable logic arrays; 2-phase dynamics design; finite state machines; scalable design rules; speed and power considerations; floor planning and communication; layout techniques.

Elective 1

ECE 513 Introduction to Operating Systems (2, 1, 0)

Motivations, functions and evolution.

Processes and concurrent programming. Memory management: static relocation, virtual memory segmentation, paging, load control.

I/O and file systems: file structures, disk management, naming drivers. Scheduling algorithms, protection user interfaces etc.

Elective 2

ECE 511 - Introduction to Medical Electronics (2, 1,0)

Basic physiological considerations for non-medical personnel. Patient safety and safety code electromedical apparatus. Transducers for monitoring physiological events. Electromedical instrumentation analysis and design; EEG; ECG and EMG amplifier design:

Applications of sonic and ultrasonic in medical electronics. Applications of microprocessors in the design and analysis of medical instrumentation.

POWER SYSTEMS ENGINEERING TECHNOLOGY OPTION

Several Courses in Power Systems Engineering with codes **PSE** are designed for students that want to major in power systems engineering option.

Rationale:

There is the need for all professional engineers to understand their role with regards to the environment. Energy supply and demand is the largest source of environmental problems and this is studied in full to widen the scope of courses offered by the department into the field of power engineering especially in the areas of power generation, distribution, power plant manufacturing, load flow etc. Also, electric drives which constitute an important component in the interface of electronic and control systems to practical applications is also studied in this section.

Aims:

To make students aware of power engineering, typical voltage and current levels and typical plant.

To develop the students understanding of the techniques used to analyze electrical power systems under steady state and transient conditions.

To enable students to design simple power systems in terms of plant ratings, short circuit fault levels etc. To develop an awareness of the role electrical power systems play in industrial development.

To apply analytical techniques to a power environment.

To make the students aware of the link between energy engineering and the environment, its scale and the main areas of concern.

To analyze the design, construction and operating performance of various motors in relation to established and developing technologies.

Learning Outcomes:

At the end of this course, the students will be able to:

- i demonstrate a knowledge of the applications of various motor drive systems and the respective performance criteria.
- ii perform short-circuit fault and load flow calculations for simple networks.
- iii use commercial software packages for analysis of complex networks.
- iv design simple distribution networks and specify fault levels, current ratings and the protection system.

- v understand the principles of operation of a power system.
- vi understand the design, construction and mode of operation of specific motor types.
- vii analyse a motor drive system in terms of generalized machine theory.

Main Teaching and Learning Activities

Lectures will be used to introduce concepts with tutorial work to develop familiarity. The programme will be supported by supervised laboratory sessions where practical aspects of the subject will be experienced.

Assessment:

Laboratory 20% Test 20% Examination 60%

Code: PSE 409
Credit Units: 2
Title: Electrical Power Plant Engineering
Pre-requisite: PSE 312

Content:

Nuclear Power Plants: Schematics of nuclear power systems. Brief treatment of fission of nuclear fuel, safety and environmental limitations of the nuclear reactor, nuclear fusion. Economics of Power Generations; Capital plant cost versus operational production cost. New energy sources for power plants; Solar energy, windmill, tidal water plant, etc.

Code: PSE 413
Credit Unit: 3
Title: Power Systems and Studio I

Content:

Design Features and Construction of simple power system equipment.

Study of common equipment for power system distribution centres and installation practices; earthing, protection, transformers, machines and apparatus. Polyphase circuits. Inductance and capacitance of transmission lines; resistance and skin effect. Current and voltage relations in a transmission line. Generalized circuit constants, circle diagrams. Application of matrix algebra to power system calculations. Modeling of power system components. Formulation of the load flow problem for digital computer solutions; methods of solution using DC, Newton Raphson, Second Order, Gauss-Seidel, Hessian and the fast decoupled techniques. Sparsity techniques and optimal ordering methods. Stochastic Load flows and applications. Fault Analysis using the digital computer. Power Systems Stability Analysis and Solution techniques.

Code: PSE 411
Credit Unit: 3
Title: Electrical Machines
Pre-requisite: PSE 312

Content:

Electrical Machine Structures and Construction. Machine Windings Concentrated and Distributed Windings: D.C. and A.C. version, The phase and multiphase windings, Induction machines: Review of equivalent circuits and torque-slip characteristics. Circle diagram method of performance prediction; M.M.I. produced by Electrical machine windings. Winding Factors and Transients: the coupled circuit viewpoint.

Synchronous machines on Infinite bus bars. Parallel operation of Synchronous Generators. Electromechanical Transient Stability. Design of Electrical Machines; Transformers, D.C. and A. c.

Machines. Induction machines (3 Phase and Single phase types)

Laboratory:

- i Tests on an Alternator

- ii Characteristics of Machine Infinite-bus Systems Operating Charts.
- iii Transients on Machine Systems
- iv Characteristics of model Transmission Lines.
- v Electrical Machines and Power Systems Protection
- vi The Automatic Voltage Regulator.

Code: PSE 501/502
Credit Unit: 3/3
Title: Project I & II

Content:

Investigation into a suitable topic in power System Engineering Technology involving literature search design, construction, computer programming etc.

Conclusion of PSE 501 (Project 1) and the presentation of a dissertation. The student undergoes an oral examination on the subject of the projects.

Code: PSE 503
Credit Unit: 2
Title: Power System Engineering Studio II

Content:

Testing and location of faults, Certification. Layouts, architects plans, frame works and equipment layout, Installation design, planning and execution; application to domestic, industrial consumers.

Code: PSE 505
Credit Unit: 2
Title: Seminars and Industrial Visits

Content:

Each student will be required to present a seminar on an approved topic in power system engineering technology. Industrial visits to firms, industries and power stations will be organized. Reports on these will be assessed accordingly.

Code: PSE 506
Credit Unit: 3
Title: Electric Drive Systems
Pre-requisite: PSE 403

Content:

A study of the steady-state and transient operation of d.c and a.c. Machines. The generalized two-axis theory of electrical machines in the form of differential equations. Solution of short-circuit, oscillation and other practical transient problems. Methods of allowing for saturation and other non-linear effects. Eddy currents in iron and copper parts of the machine and their effect on transient performance.

Code: PSE 507
Credit Unit: 3
Title: High Voltage Engineering Technology

Content:

HV cascaded transformers and series resonate testing. D.C. multiplier circuits. Impulse generation and analysis. Avalanche and steamer breakdown in gases. Dielectric loss and relaxation, failure mechanism in solids. Vacuum insulation. Conduction and breakdown in dielectric liquids. Introduction to circuit breaker technology.

Code: PSE 508
Credit Unit: 3

Title: Rotating Machines Controls
Pre-requisite: PSE 312

Content:

Graphical representation of electromechanical systems-block diagram of linear systems, signal flow graphs of linear systems. Mason's formula for computing the gain of a signal flow graph, signal flow graph and initial conditions transfer functions and all-integrator signal flow graphs, analogue computer representation of dynamic system.

Use of d.c. machines in feedback systems. Use of a.c. machine in control systems. Recent trends in synchronous machine modeling in the electricity *supply* industry. System equivalents for dynamic and transient stability studies.

Code: PSE510
Credit Unit: 3
Title: High Voltage Direct Current Transmission

Content:

Historical background. Comparison between H.V.a.c and H.V.d.c. overhead and underground transmission schemes. The development of the high-voltage heavy current mercury arc valve. Converter connections. Detailed equivalent circuits. Constant current and constant extinction angle modes of operation. Analysis of d.c. transmission systems. Harmonic on the a.c. and d.c. sides and filters for their suppression.

Code: PSE 511
Credit Unit: 3
Title: Optimization Techniques for Power Systems

Introduction to power system control: Load frequency control, Economic dispatch and automatic generation control, voltage and VAR control. Dynamic programming and classical priority schedule methods and unit commitment. State estimation principles. Steady and transient security analysis. Automatic contingency selection. Network equivalents.

Code: PSE 512
Credit Unit: 3
Title: Power System Protection

Content:

Principle of protection of high and low voltage systems. Over current and earth-fault identification and discrimination. Unit and distance protection pile to wire, carrier current and VHF communication principles; distance measurements, selection of zones acceleration and intertrip schemes. Electromagnetic, solid state and digital equipment for protection and control of substation. Fuses and earth leakage devices.

Code: PSE 513
Credit Unit: 3
Title: Power System Planning, Reliability and Economics

Content:

Nigeria energy resources. Methods of electrical power generation. Load forecasting and source analysis. Principles and Practice of L.V.A.C. transmission and distribution. Mathematical Methods used in planning and source utilization and of transmission networks. Reliability calculations for power system planning. The Power system investment pricing rules. Energy sector modeling. Pricing and load management. Network economics and application to the Nigerian Power System. Rural Electrification.

Code: PSE 514
Credit Unit: 3
Title: Special Topics in Power Systems Engineering

Content:

Lectures on selected and relevant topics from recent advances in power systems engineering.

Code: PSE 516
Credit Unit: 3
Title: Electromagnetic of Electrical Machines
Pre-requisite: EEE 305

Content:

Field approach to machines and devices. Methods of solution of low-frequency fields, including eddy-currents. Reduction to numerical form. Computer techniques. Electromagnetic induction. Energy transfer and Poynting vector. Calculation of loss. Machine and transformer end region and stray losses. Hannonic, magnetic network and travelling-wave methods of analysis. Calculation of forces in d.c. and a.c. fields. End winding forces.

17.0 DETAILS OF MEMBERS OF STAFF

FACULTY: SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY

DEPARTMENT: ELECTRICAL ELECTRONIC ENGINEERING

S/N	SURNAME	QUALIFICATIONS WITH DATES	PROFESSIONAL AFFILIATIONS	COURSES	RANK
1	Ogbogu, S. O. E.	B.Tech (1980) Bradford, M.Sc(1981) Bradford, PhD (1986) Bradford	MNSE, MIEEE, COREN Reg.	EEE 307 EEE 501 ECE 509 PSE510	Professor
2	Chukwudebe, G. A.	B.Eng(1981) UNN, M.Eng(1985) UNN, Ph.D(1992) Newcastle-Upon-Tyne	FNSE, MIEEE, COREN Reg.	ECE 405 COE 513 ECE 510 ECE 514	Professor
3	Okafor, E. N. C.	B.Eng(1988)FUTO, M.Eng(1990) UNILAG, Ph.D(2004)FUTO	MNSE, MIEEE, COREN Reg.	EEE 301 PSE 507 PSE 312 PSE 512	Professor
4	Ndinechi, M. C.	B.Eng(1988) FUTO, M.Sc(1991) FUTO, Ph.D(2008) Greenwich	MNSE, MIEEE, COREN Reg.	COE 504 COE 506	Professor
5	Opara, F. K.	B.Eng(1990), M.Sc(1995), Ph.D(2008) FUTO	MNSE, MIEEE, COREN Reg.	ECE 407 ECE 411 ECE 501 EEE 202 ECE 502	Reader
6	Ezeh, G. N.	B.Eng(1994), M.Eng(1997) ESUT, Ph.D(2011) FUTO	MNSE, MIEEE, COREN Reg.	COE 407 COE 505	Reader
7	Dike, D. O.	B.Eng(1995)FUTO, M.Eng(2002) FUTO, Ph.D(2008) TTU USA	NSBE USA, MNSE, MIEEE, COREN Reg.	ECE 409 ECE 509 ENG 226 PSE 512	Reader-Ag. HOD
8	Izuegbunam, F. I.	B.Eng(1995) FUTM, M.Eng(2002) FUTO, Ph.D(2011) FUTO	COREN Reg.	PSE 411 PSE 511 PSE 312 PSE 516	Reader
9	Mbaocha, C. C.	B.Eng(1995) ESUT, M.Sc(2004) FUTO, Ph.D(2011) FUTO	MNSE, COREN Reg.	EEE 307 EEE 501 ECE 302 COE 508	Senior Lecturer
10	Achumba, I. E.	B.Sc(1989) UNN, M.Sc(1998) FUTO, Ph.D(2011), Pdoc (2013) Portsmouth UK	MIEEE	EEE 311 EEE 401 ECE 409 EEE 204 ECE 508	Senior Lecturer

11	Onojo, O. J.	B.Eng(1997) FUTM, M.Eng(2002) FUTO, Ph.D (2014) FUTO	MIEEE	EEE 305 EEE 407 PSE 513 EEE 204 ENG 226 PSE 506	Senior Lecturer
12	Uzoечи L. O.	B.Eng(1998) FUTO, M.Sc(2006) FUTO, Ph.D(2011) TTU-USA	NSBE-USA, MIT- ETT FELLOW, MNSE, MIEEE, COREN Reg.	PSE 511 PSE 513 ENG 226 PSE 508	Senior Lecturer
13	Ononiwu G. C.	B.Sc(1998) FUTO, M.Sc(2007) Halmstad SWEDEN, Ph.D(2014)FUTO	MNSE, MIEEE, COREN Reg.	ECE 407 ECE 509 ENG 307 ENG 214 ECE 506	Senior Lecturer
14	Onyelucheyia O. E.	B.Eng(1997) FUTO, M.Eng(2003) FUTO, Ph.D (2013) FUTO	MNSE, MIEEE, COREN Reg.	ENG 307 ENG 308	Senior Lecturer
15	Okoronkwo C. A.	B.Eng(2000) FUTO, M.Eng(2006) FUTO, Ph.D (2011) FUTO	MNSE, MIEEE, COREN Reg.	ENG 213 ENG 224	Senior Lecturer
16	Chilakpu K. O.	B.Eng(1995) FUTO, M.Eng(2008) FUTO, Ph.D (2015) FUTO	MNSE, NIEEE, COREN Reg.	ENG 201 ENG 203	Senior Lecturer
17	Nwokorie E. C.	B.Eng(1986) UNN, M.Sc.(2006) UNIPORT, Ph.D (2015) UNIPORT	MIEEE, MNCS, MCPN, NIWIIT, OWSDS	CSC 201	Senior Lecturer
18	Iwu H. C.	B.Eng(1989) UNN, M.Sc.(1994) FUTO, Ph.D (2009) ABSU	MNSE, MASS, IBMS	STA 211	Senior Lecturer
19	Umana R. S.	B.Sc. (1997) UNICAL, M.Sc.(2004) FUTO, Ph.D (2008) UNN	MNMS, MNAMP, MASS	MTH 203	Senior Lecturer
20	Obi M.	B.Sc. (1987) ASTECH, M.Sc.(1991) NAU, Ph.D (2014) UNIJOS	MNMS, MMAN	MTH 203	Senior Lecturer
21	Amaechi L. N.	B.Sc. (1991) UNN, M.Sc.(1996) UNN, Ph.D (2013) UNN	MNIIA, MNPSA	GST 201	Senior Lecturer
22	Ugwuanyim G. U.	B.Sc. (1985) UNN, M.Sc.(1989) UNILORIN, Ph.D (2014) FUTO	MNSE, MIBS	STA 211	Senior Lecturer
23	Chukwuchekwa N.	B.Eng(2000) FUTO, M.Sc(2006) FUTO, Ph.D(2012) CARDIFF UK	MIEEE, COREN Reg.	COE 411 EEE 409 ENG 307 ENG 226 COE 510	Senior Lecturer

24	Agubor C. K.	B.Eng(1991) FUTO, M.Eng(2004) UNIPORT, Ph.D (2015) FUTO	MNSE, COREN Reg.	PSE 409 PSE 508 EEE 302	Senior Lecturer
25	Akwukwaegbu, I. O.	B.Eng(1991) FUTO, M.Sc(1997) FUTO, Ph.D(2016) FUTO	MNSE, MIEEE, COREN Reg.	COE 407 COE 509 COE 318 COE 514	Lecturer I
26	Olubiwe M.	B.Eng(1997)UNIPORT, M.Eng(2004) UNIPORT, Ph.D (2015)FUTO	MNSE, COREN Reg.	EEE 301 PSE 409 PSE 507 EEE 206 PSE 516	Lecturer I
27	Ezebili I. F.	B.Eng(2004) FUTO, M.Sc(2008)	MNSE	EEE 305 ENG 307 COE 405 ENG 308 EEE 306 COE 508	Lecturer I
28	Nosiri O. C.	B.Eng(2002) NAU, M.Eng(2009) NAU, Ph.D(2015) NAU	MNSE, MIEEE, COREN Reg.	COE 411 COE 513 ENG 214 COE506 COE 504	Lecturer I
29	Chukwu K. U.	BA Eng(1997) Uni Cal, MA Eng(2006) IMSU, Ph.D(2015) NAU		ENG 313	Lecturer I
30	Okoz S. O.	B.Eng(2003) FUTO, M.Eng(2009) UNN	MNSE, COREN Reg.	EEE 307 PSE 413 EEE 306 PSE 312 PSE 506	Lecturer I
31	Ezirim K.C	B.Eng(2000) NAU, M.Tech(2007) RSUST, Ph.D(2016) FUTO	MNSE, COREN Reg.	ENG 213 ENG 224	Lecturer I
32	Opara R. O.	B.Eng(1995) FUTO, M.Eng(2010) FUTO	MNSE, MIEEE	PSE 413 PSE 503 EEE 206 EEE 302 PSE 516	Lecturer I
33	Diala U. H.	B.Eng(2003) FUTO, M.Eng(2009) FUTO, M.Sc (2011) Sheffield UK	MNSE, MIEEE, COREN Reg.	PSE 413 PSE 513 PSE 312 EEE 306 PSE 506	Lecturer I
34	Ezema L. S.	B.Eng(2004) NAU, M.Sc(2007) Sweden	MNSE	COE 505 COE 503 COE 318 COE504	Lecturer I

35	Ugwuegbu C. C.	B.Eng(1995) FUTO, M.Sc. (2010) Imperial Coll., UK	MNSE, COREN Reg.	ENG 207 ENG208	Lecturer I
36	Joe-Uzuegbu C. K.	B.Eng(2006) FUTO, M.Sc(2012) FUTO	MNSE, MIEEE	PSE 411 ECE 509 ENG 214 PSE 510	Lecturer II
37	Omuekwusi N. C.	B.Eng(2007) FUTO, M.Sc(2012) FUTO	MNSE, MIEEE, COREN Reg.	EEE 305 PSE 413 ENG 226 EEE 306	Lecturer II
38	Iwuchukwu U. C.	B.Eng(2006) FUTO, M.SC(2015) FUTO	MNSE, MIEEE, COREN Reg.	ECE 505 COE 411 COE 413 ENG 214 COE 318 COE 514	Lecturer II
39	Okpara R.C.	B.Eng(2007) FUTO, M.Eng (2012) FUTO	MNSE, MIEEE, COREN Reg.	EEE 401 COE 503 END 214 COE 510	Lecturer II
40	Okafor K.C.	B.Eng, M.Eng	MIEEE, MNSE, COREN Reg.	EEE 405 EEE 409 EEE 405 ENG 214 ECE 508	Lecturer II
41	Atimati, E. E.	OND(2002)AP, B.Eng(2008) UNIBEN, M.Sc(2012) FUTO	MNSE, MIEEE	COE 405 COE 513 COE 514 ENG 214	Assistant Lecturer
42	Ozioko, O. O.	B.Eng(2004) UNN, M.Sc(2012) FUTO	MNSE		Assistant Lecturer
43	Dike B.C.	B.Eng(2006)FUTO, M.Sc(2016) FUTO	MNSE, COREN Reg.	EEE 305 COE 411 COE318 EEE 302	Assistant Lecturer
44	Akande A.O.	B.Eng, M.Eng	MNSE, COREN Reg.	EEE 405 COE 509 EEE 311 ECE 302 ECE 510	Assistant Lecturer
45	Unigwe O. C.	B.Eng (2010)FUTO, M.Sc(2014)	MNSE		Assistant Lecturer
46	Nduka O. S.	B.Eng(2010) FUTO, M.Sc(2014)IMPERIAL UK	NIL		Assistant Lecturer
47	Eze, P. U.	B.Eng (2010)FUTO, M.Sc(2015) Sheffield UK	MIEEE, MNIM, MNSE		Assistant Lecturer
48	Azuatalam D. T.	B.Eng (2011)FUTO, M.Sc(2015) EDINBURG	NIL		Assistant Lecturer

		UK			
49	Ndukwe C. I.	B.Eng (2011)FUTO, M.Sc(2015) LEEDS UK	MNSE	ECE 411 ECE 405 ECE 316 ECE 514	Assistant Lecturer
50	Onwuagba C. J.	B.Eng (2011)FUTO	-		Graduate Assistant
51	Ekwueme E. U.	B.Eng (2011)FUTO	MIEEE		Graduate Assistant
52	Onugha I.U.	B. Eng (2012), FUTO	-		Graduate Assistant
53	Paulinus-Nwammuo C.F.	B. Eng (2011) FUTO	-		Graduate Assistant
54	Ezeugwu, E. O.	B. Eng (2014) UNIBEN	-		Graduate Assistant
55	Opara R. A. I.	C&G Finals(1977) ZARIA, ICAO(1977) ZARIA, OND(2001) HND(2005)POLY NEK, PGD(2011) FUTO	MIEEE		Deputy Chief Technologist
56	Akinde O. K.	HND(1994)POLY IBADAN, B.Eng(2006) UNIPORT, M.Eng(2010) FUTO	MNSE, MIEEE, COREN Reg.		Deputy Chief Technologist
57	Ekwue G.	OND(1993) FED POLY IDAH, HND(1996)IMT, PGD(2010) FUTO	MNIST		Deputy Chief Technologist
58	Asuzu C. J.	OND(1992) NIST IBADAN, HND(1995)NIST IBADAN, B.Eng(2004) UNIPORT, M.Sc(2012) FUTO	GMNSE, MIEEE, MNIST		Deputy Chief Technologist
59	Okonkwo P. U.	HND(1984) AUCHI POLY, PGD(1998)FUTO	NATE		Deputy Chief Technologist
60	Murako J. O.	OND(1987) IDAH POLY, B.Sc(1996)Alabama(A&M)	NATE, MIEEE		Deputy Chief Technologist
61	Ekechukwu E. E.	OND (1996), HND (1999) IMT, PGD (2008)IMSU, B.Eng	NATE		Senior Technologist
62	Onyiaji B. B.	B.Eng(2005) ESUT, M.Eng (2014) ESUT	MNSE, COREN Reg.		Senior Technologist

63	Onyiaji C. B.	B.Eng(2005) ESUT, M.Eng (2014) ESUT	MNSE, COREN Reg.		Senior Technolo gist
64	Alaoma A. S.	B.Eng(2008)FUTO			Technolo gist I
65	Nwogu V.	OND(1991) AIFPUA, HND(1994) IMT	NATE		Technolo gist I
66	Ezenwobodo O. R.	B.Eng(2003)FUTO			Technolo gist II
67	Obioha O.	B.Eng(1999) ATBU			Technolo gist II
68	Nwachukwu D.	WAEC(1984), NCE(1989)			Senior Technical Officer
69	Agwu M.	NABTEB(2007) UCC			Senior Lab Superviso r
70	Lawrence O. S.	OND(2008)FEDPOLYNE K, HND(2012) FEDPOLYNEK			Senior Lab Assistant
71	Obiekwe C.	WAEC(2011)			Lab Assistant
72	Okoreaffia O.	BA(1994)ABSU, M.Sc(2001) IMSU, MA(2012) IMSU			Principal Asst. Registrar
73	Tony-Azuogu C.	WAEC, ADV.NABTEB, OND, HND, PGD			Principal Executive Officer II
74	Anozie J.C.	WAEC, DIPLOMA(1991), ADV.DIPLOMA(2002)			Computer Operator
75	Onwuegbuch unam G.	WAEC, NCE, B.Sc			Admin Assistant
76	Asogwa M.U.	WAEC(2001), ADV.DIPLOMA(2012), B.A (2012) EKSU			Data Processor
77	Ogubuike O.	OND(2012), FEDPOLY NEK			Executive Officer
78	Uzoma J. C.	WAEC(1998)			Clerical Superviso r
	Madumere G.	FSLC, WAEC(2008), DIP(2015)NOBLE			Clerical Officer



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