ELIZADE UNIVERSITY
ILARA-MOKIN, ONDO STATE

DEPARTMENT OF COMPUTER ENGINEERING

Handbook for Undergraduate Programme

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Engr. Prof. Samuel DARAMOLA
BSc. MSc. PhD
Head, Department of Computer Engineering

A publication of the Department of Computer Engineering, Faculty of Engineering, Elizade University, Ilara-Mokin, Ondo State, Nigeria.

Note: The Information contained in this handbook is accurate and up-to-date as at the time of publication. However, the matters covered are subject to change from time to time. The Department will publish such changes, if there are any, in the next edition of the handbook.

Prof. Kayode T. IJADUNOLA, FWACP, MD

VICE-CHANCELLOR

Engr. Prof. Sunday Babatunde ADEYEMO

B. Sc, M.Tech () PhD (), COREN Regd. (R.)
FNSE, FNIMechE

DEAN, Faculty of Engineering

Engr. Prof. Samuel A. Daramola,
B.Eng. (OSUA), M.Eng. (Uniport) PhD (CU)
Head, Department of Computer Engineering

Preface

The Departmental Handbook provides information to prospective students and registered students on the programme of studies offered by the Department of Computer Engineering, Elizade University, Ilara-Mokin, Ondo State, Nigeria. It is hoped that the information would assist students to derive maximum advantages from the opportunities and facilities available in the Department and the University in planning their academic programmes.

The currently available five-year Engineering Degree programme is built on a common foundation of basic studies, comprising Mathematics, Basic Sciences, Engineering Sciences and General studies. The programme is designed to facilitate specialization while allowing opportunities for taking approved courses from other areas. The programme is also fashioned to allow the prospective Engineer graduate to have the appropriate technical expertise and human perspective.

The Department of Computer Engineering, Elizade University, Ilara-Mokin, Ondo State, Nigeria issues this Handbook as a general guide to its courses and facilities. It forms no part of a contract. The Department reserves the right to modify or alter without prior notice any of the contents herein.

Table of contents

Title page	*i*
Preface	*vii*
Table of Contents	*viii*
Principal Officers of the University	*ix*
Mission and Vision of the University	*1*
General Information to Students	*2*
Members of Staff	*10*
Programme Philosophy	*14*
Programme Objectives	*16*
Admission Requirements	*17*
Programme Duration	*18*
Graduation Requirements	*19*
List of Courses	*32*
Course Synopsis	*50*
List of Laboratories and Workshops	*110*

PRINCIPAL OFFICERS OF THE UNIVERSITY

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B.A. (UNN.)

CHAIRMAN, BOARD OF TRUSTEES
Chief Michael Ade-Ojo (OON)
B.A. (UNN.)

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LL.B(Ife). LL.M(Pennsylvania)

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B.Eng(Nottingham), Ph.D(McGill)

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FWACP, MD

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HND (Auchi), MBA (Ibadan), ACA, FCA, ACTI

LIBRARIAN
Dr. Ese Ugwunwa Chinyere
B.Sc. (Abia), M.Sc Info Sc. (Ibadan), M.Sc Mgt Info Sys (Convenant), Ph.D (Babcock)

1. MISSION AND VISION OF THE UNIVERSITY

1.1 The University's Mission

To produce graduates with the appropriate skills and knowledge for the development of the nation and global competitiveness.

1.2 The University's Vision

Elizade University seeks to be a globally competitive institution that produces entrepreneurial, innovative and ethical graduates.

1.3 The University's Strategic Objectives

The strategic objectives of the University (Elizade University, Ilara- Mokin) are to:

a. produce graduates of international standard, with appropriate knowledge and skills in their field of study, who will be highly employable and to employ themselves;

b. provide high-quality research and development activities that will promote the development of the Nation and enhance the image of the University and the researchers;

c. harness modern technology, especially ICT and modern social, economic and financial strategies to run a cost of the efficient and effective academic programme and institutional management;

d. provide services that have relevance to and impact on the local community and the Nation;

e. provide conditions of study, work and living in the University Community that are of the appropriate standard;

f. expand access to tertiary education in the face of unmet demand; and

g. operate as an equal opportunity educational institution, sensitive to the principle of gender equity and non-discriminatory based on race, ethnicity, religion or physical disability.

2. GENERAL INFORMATION TO STUDENTS

2.1 History and Location of the University and the Programme

The Elizade University is located in lIara-Mokin in Ondo State of Nigeria. The State was created on 3 February 1976 from the former Western State. It originally included what is nowEkiti State, which was carved out of Ondo State in 1996. Akure is the State capital. The State lies between Longitudes 4° 30' and 6' East of the Greenwich Meridian, 5° 45' and 8° 15' North of the Equator. This means that the State lies' entirely in the tropics. Ondo State is bounded in the North by Ekiti and Kogi States; in the East by Edo State; in the West by Oyo and Ogun States; and in theSouth by the Atlantic Ocean. The State has a land area of 14,788.723 Square Kilometers. The State has a population of 3,441,024 comprising 1,761,263 males and 1,679,761 females.

Elizade University emphasizes learning, research and development. Having completed all due processes, approval for the establishment of Elizade University was given by the Federal Government on 22 February, 2012. The approval was conveyed vide the Provisional Licence to Operate as a Private University No. 46 dated 28 February, 2012 issued by the

National Universities Commission. Elizade University aims to attract the best and the brightest students in Nigeria and beyond. The main aim is to provide them with practical-oriented scientific, technological and arts education which shall make them self-reliant while preparing them for future leadership and success in their chosen careers in the highly competitive new knowledge society. Academic activities of the Elizade University started at 2012/2013 session (6th January, 2013). The Engineering Faculty at the Elizade University commenced in September, 2013 during the 2013/2014 academic session.

The Department of Computer Engineering started with the take-off of the faculty of Engineering during the 2013/2014 academic session. The total students' enrolment rose from 30 in the first year to the current figure of 91 students' enrolment for its Bachelor of Engineering (Computer Engineering).

2.1 Roll of Honours for Students

The Senate decided that the Roll of Honours for Students be instituted in the University to enhance discipline and good performance among students. All students are enjoined to strive to be on the Honours Roll.

The beneficiaries must have a minimum CGPA of 4.0 out of 5.00 and the beneficiary must maintain this grade annually to continue to enjoy the award. The recommendations must be processed along with the results of the second Semester Examinations. Students must be of good conduct. He or she must not have outstanding or carry-over courses and must not be repeating the year. No student on Leave of Absence shall enjoy the Annual Roll of Honours Award. No student

that has a disciplinary problem shall enjoy the award. The award shall be based on the recommendation of the Department Board of Examiners and the Faculty Board of Examiners. Each beneficiary shall be given a certificate and scholarship.

The Details of the honours roll are as follows:

The Honours Roll should be at three levels as follows:

a. Founder list: for a suitably qualified candidate with a minimum CGPA of 4.50 on a basis of 5.00
b. VC list: for a suitably qualified candidate with a minimum CGPA of 4.20 on a basis of 5.00, and
c. Dean's list: for a suitably qualified candidate with a minimum CGPA of 4.00 on a basis of 5.00

2.3 Information on Division of Students' Affairs

Information on students' welfare can be summarized as follows:

a. Guidance and Counseling Unit: The Division of Student Affairs has Professional Counselors who are committed to helping students grow in self-understanding in the process of integrating their personal and academic experiences. The services are free to students and are confidential (not used as part of his/her other University records). The services include personal Counseling, group counseling, study skills improvement, tests anxiety reduction, personal crisis intervention, psychological testing, career and occupational counseling, and settlement

of grievances between students, where necessary. Consultations are made with campus organizations, sound academic Departments, to ensure that students' problems are resolved satisfactorily. The Counselors can be contacted on the ground floor of the Senate Building;

b. Scholarship and Financial Assistance: The Division of Students' Affairs serves as a link between students and Sponsoring authorities, both within and outside Nigeria. Students are to check the Notice Boards in their respective faculties as well as those at the Division of Student Affairs Building for advertisements and other relevant information. Liaison is also maintained between students and governments at various levels for scholarships and bursaries.

2.4 Information on the University Library

Membership of the Library is available, on completion of a registration card, to all students, members of the senior staff of the University and such other persons as may be determined by the Library Committee or the University Librarian on behalf of it. Students are required to renew their registration at the beginning of each academic year. Library Cards and Borrower's Tickets are not transferable; books issued on them remain the responsibility of the person whose name appears on them. A Lost Library Card or Borrower's Ticket may be replaced on submission of a written application.

2.5 Disciplinary Measures

(i) Examination Offenses

(a) A candidate shall not be allowed during an examination to communicate by word or otherwise with any other candidate nor shall leave his place except with the consent of an invigilator. Should a candidate act in such a way as to disturb or inconvenience other candidates, he shall be warned and if he persists, he may, at the discretion of the invigilator, be excluded from the examination room. Such an action by the invigilator must also be reported in writing through the Head of Department to the Vice-Chancellor within 24 hours.

(b) It shall be an examination offense for any student, staff or any person whatsoever to impersonate a candidate in any University examination. Any student or staff of the University found guilty under this regulation shall be subjected to disciplinary action by the appropriate authority of the University. The candidate impersonated shall also be liable to an infraction of this regulation where it is established directly from circumstantial evidence that the impersonation is with his knowledge or connivance.

(c) No candidate shall take into an examination room, or have in his possession during an examination any book or paper or printed or written documents, whether relevant to the examination or not unless specifically authorized to do so. An invigilator has the authority to confiscate such documents.

(d) Mobile phones are not allowed in examination halls.

(e) A candidate shall not remove from an examination room any papers, used or unused, except the question paper and such books and papers if any, as he is authorized to take into the examination room.

(f) Candidates shall comply with all "directions to candidates set out on an examination answer book or other examination materials supplied to them. They shall also comply with the direction given to them by an Invigilator.

(g) Candidates shall not write on any paper other than the examination answer booklets. All rough work must be done in the answer booklets and crossed out neatly. Supplementary answer booklets, even if they contain only rough work, must be tied inside the main answer booklet.

(h) When leaving the examination room, even if temporarily, a student shall not leave his written work on the desk but he shall hand it over to an Invigilator. Candidates are responsible for the proper return of their written works.

(i) Smoking shall not be permitted in the examination room during examination sessions.

(j) Any candidates or staff who attempts in any way to unlawfully have or give pre-knowledge of an examination question or to influence the marking of scripts or the award of marks by the University examiner shall be subjected to disciplinary action by the appropriate authority of the University.

(k) If any candidate is suspected of cheating, receiving assistance or assisting other candidates or infringing any other examination regulation, a written report of the circumstance shall be submitted by the invigilator to the Vice-Chancellor within 24 hours of the examination session. The candidate concerned shall

be allowed to continue with the examination.

(l) Any candidate suspected of examination malpractice shall be required to submit to the invigilator a written report immediately after the paper. Failure to make a report shall be regarded as a breach of discipline. Such a report should be forwarded along with the invigilator's report to the Vice-Chancellor.

(m) Where a Head of a Department fails to forward a report on examination malpractice to the Vice-Chancellor, such action would be considered misconduct.

(n) Where the Vice-Chancellor is satisfied based on the report forwarded to him that any candidate has a case to answer, he shall refer the case to the Central Committee on Examination Malpractices.

(ii) Penalties for Examination Malpractices and other Offenses

(a) Any examination offense would attract an appropriate penalty including outright dismissal from the University.

(b) Where the Vice-Chancellor has reason to believe that the nature of any question or the content of any paper may have become known before the date and time of the examination to any persons other than examiners of the paper, the Board of Examiners and any official of the University authorized to handle the paper, he may order the suspension of the examination or the cancellation of the paper or set of a new paper and shall report the matter to the Senate. The Vice-Chancellor shall also take any disciplinary measure against any student or students involved as he may deem appropriate.

If in the opinion of an invigilator, circumstances arise which render the examination unfair to any candidate, he must report

the matter to the Vice-Chancellor within 24 hours after the examination. Where such matter is reported to the Vice-Chancellor he may take such action as he deems fit. If he directs that another examination be held, that examination shall be the examination for this regulation.

(c) Any candidate or member of staff may complain to the Vice-Chancellor that an examination has been improperly conducted. The Vice-Chancellor shall investigate the complaint and report the results of his investigations to the Senate which shall take such action as it may deem appropriate, including with-holding a result or deprivation of the award of a degree, diploma etc. as laid down in her Statues. However, where it is shown to the satisfaction of the Committee of Deans that any alteration or amendment of a University regulation involving a change in a course of study or examination requirements has caused hardship to a candidate in any examination, the Committee of Deans shall make such provisions as it thinks fit for the relief of such hardship and report same to Senate.

2.6 Degree Programme

Bachelor of Engineering in Computer Engineering (B. Eng. Computer Engineering)

2.7 Members of Staff

A. Academic Staff

Table 21: List of Full-Time Staff in the Department

S/N	Names	Rank	Dedicated /Shared	Qualifications		Research Area & Contact details	Teaching Years
1	Engr. Prof. Samuel A. DARAMOLA (R.22268)	Professor/ HOD	Dedicated	Ph.D	Covenant University, Otta, 2008.	Computer Vision and Embedded System	21
				M.E	University of Port		

				ng	Harcourt, Port Harcourt, 2002		
				B.Eng	Ondo State University, Ado- Ekiti, 1996		
2.	Engr. Prof. DAHUNSI Folasade Mojisola (R.25180)	Professor	Adjunct	Ph. D.	(WITS, South Africa)	Communication system, Smart system, Embedd	20
				M.Eng	(ATBU)		

						ed systems and Internet of Things	
				B.Eng.	(UNILORIN)		
3.	Engr. Dr. Olugbenga Ogidan	Associate Prof.	Dedicated	B.Eng. (Ado Ekiti), M.Eng. (Akure), D.Tech. (Cape Town), COREN Regd. (R20748), MCPN (No. 002815/2010), MInst.P.		Systems Automation and Control, Real-time and Embedded systems, Internet of Things	12

				(No.4621).			
4.	Engr. Dr. Adebimpe Omolayo ESAN (R.36882)	Senior Lecturer	Dedicated	PhD	LAUTECH, Ogbomoso 2021	Natural Language Processing, Intelligent systems and Electronic Health	10
				M.Tech	LAUTECH, Ogbomoso 2014		
				B.Tech	LAUTECH, Ogbomoso 2008		
5.		Senior Lecturer	Dedicated	PhD	Obafemi Awolowo University,	Ergonomic, Mechanic	10

	Engr. Dr. Oluranti Abiola (R.48892)				Ile-Ife ,2019	al Productio n and Material Engineerin g	
				M.Sc.	Obafemi Awolowo University, Ile-Ife, 2014		
				B.Sc.	Obafemi Awolowo University, Ile-Ife , 2008		

6.	Engr. Dr. Ismaila Olanrewaju ALABI (R.39949	Senior Lecturer	Dedicated	PhD	University of Ibadan, 2024	Thermofluids and Energy	10
				M.Sc.	University of Ibadan,		
				B.Tech	(LAUTECH),		
7	Dr. Omoruyi Osemwegie Nosamudiana	Senior Lecturer	Adjunct	PhD	Covenant University, 2022	Computer Security, Computer Networking	10
				M.Sc.	Obafemi Awolowo University, Ile-Ife, 2014		

				B.Eng	Covenant University, 2008		
8.	Engr. Dr. ELESEMOYO Isaac Oluwafemi (R.49689)	Lecturer I	Dedicated	Ph.D	Obafemi Awolowo University, Ile-Ife, 2022	Intelligent systems; Natural language processing; computer	5
				M.Sc,	Obafemi Awolowo University, Ile-Ife, 2018		

				B. Sc,	Obafemi Awolowo University, Ile-Ife, 2014	Educatio n.	
9.	Engr. OGUNNIYI Julius Olasunmibo (R.50062)	Lecturer I	Dedicated	M.Te ch	LAUTECH, 2018.	Mobile Computi ng, Artificial Intelligen ce, Compute r Networks , Telemedi cine,	7
				B.Tec h	LAUTECH, 2011		

						Biometrics.	
10.	Engr. OYEWOLE Oyeyemi Temitayo (R.57030)	Lecturer I	Dedicated	M.Sc	Obafemi Awolowo University, Ile-Ife, 2014	Communication, Artificial Intelligent, Internet of Things	9
				B.Sc	Obafemi Awolowo University, Ile-Ife, 2009		
11.	Engr. OLOWU Adekemi	Lecturer II	Dedicated	M.Sc	Obafemi Awolowo	Blockchain	7

	Joanne (R.63703)				University, Ile-Ife, 2021	Technology, Internet of Things	

B. Technical staff

S/N	Names	Discipline	Area of Specialization	Qualifications	Rank	Employment Status	Mode of Appointment
1	Mr. GANIYU Azeez A	Computer Engineering	Embedded Systems Design, IoT, Robotics and Electronics Circuits Design and Implementations	HND (Computer Engineering), BSc. (Communication Technology)	Senior Technologist	Full time	Full Time
2	Mr. Olusanya Temitope	Computer Engineering	Embedded Systems and Microprocessor	HND (Computer Engineering)	Technologist I	Full time	Full time

3	Mr. Hassan Kuranga Abdullahi	Computer Engineering	Microprocessor Design, and Digital System Design.	HND (Computer Engineering, 2006), B.Eng (Computer Engineering, 2024), PGD (Computer Science, 2014)	Senior Technologist	Full time	Full Time
4.	Mr. Olubunmi Oluwaseun Adewale	Computer Engineering	Prototyping, Software Engineering	HND (Computer Engineering, 2005), B.Eng (Computer Engineering, 2022),	Technologist 1	Full time	
5	Mr. Kayode A.M	Computer Engineering	Data communications and Computer Networks	HND (Computer Engineering, 2015)	Senior Technologist	Full time	Full time

6.	Engr. Lasisi K.A	Electrical Engineering	Basic Electricity, Power and Machine.	HND (Electrical and Electronic Engineering-Power option)	Assistant Chief Technologist	Full time	Full time
7.	Engr. Adewoyin Abrahams O.	Mechanical Engineering	Productions Engineering	PGD (Mechanical Engineering, 2017), HND (Mechanical Engineering, 2008)	Senior Technologist	Full time	Full time
8.	Mr. Adetoro Andrew	Electrical and Electronic Engineering	Electronics and Telecommunications	ND (Electrical and Electronic Engineering, 2021)	Laboratory Assistant	Full time	Full time
9.	Miss. Joy Uwaerilem	Computer Engineering	Microprocessor and Microcontroller	ND (Computer Engineering, 2015),	Laboratory Assistant	Full time	Full time

C. Administrative Non-Teaching Staff in the Department

3.0 PROGRAMME PHILOSOPHY

The B.Eng. program in Computer Engineering is built on a foundation of mathematics, computing science, and physical science. A small component of electrical engineering is introduced in the second year, with progressively larger components in the second and third years. The fourth and final year is devoted exclusively to computer systems engineering courses. Each year of the program comprises several discipline-based courses and courses taught by other discipline areas. Most courses in the first two years of the program are common for engineering students.

3.1 Career Opportunities

Computer engineering professionals have various opportunities where their knowledge and skills can be utilized in solving real life problems. The primary work of a computer engineer is to plan, design, build and test computing devices, which can either be general purpose or specific purpose devices. **Computer Network Architects** design and implement the Data communication and networking systems. They are in charge of the organization's overall network infrastructure as well as communication methods. Computer Network Architect will perform everything from analyzing and modeling existing data traffic to forecasting how the network will expand and what should be employed to sustain it. **Software developers** are responsible for the design, development, testing, and

management of various software programs. This job description includes a number of tasks, each of which requires the ability to analyze, enhance, and innovate with new technologies in development. The application levels vary by domain because this profile is used in so many sectors, including banking, digital marketing, e-commerce, and agriculture. **Cyber Security Specialist** revolves around very complex aspects and logical skills. A Cyber Security Specialist is a person who examines the security of various networks and the apps that are connected to them. A student must be familiar with computer networks and numerous state-of-the-art approaches used in cyber security, as well as the always evolving algorithms. Reverse Engineering is used in this work to guarantee rigorous thought processes and methods are used to ensure the opposing perspective is considered and what action should be made to fix the problem. **Data Engineer** although Data Science is a recently surging trend, Data has existed for quite some time. To assure the efficiency and scalability of the data storage, infrastructure, and management systems. A Data Engineer's responsibilities also include developing software components and tools that are valuable for both the development cycle and the business. **Machine Learning Engineers** are specialized in designing and building intelligent systems that are used in several software systems as well as by Businesses for various purposes. They create AI-powered systems that are based on Machine Learning and Deep Learning and have extremely precise and high-level functions. Machine Learning Engineers are typically not involved in lower-level development. **Game Developers** build real life Games. They may design, create, and manufacture user interfaces to fulfill the needs of game and simulation software

for a wide range of applications. Big Data Engineer, Data Scientist, Data Analyst, Blockchain Developer/Engineer, Computer Systems Analyst, Database Administrator, Information Security Analyst, Full Stack Developer, Information Systems Manager, and other positions are available.

4.0 PROGRAM EDUCATIONAL OBJECTIVES (peOs)

The Computer Engineering Programme Educational Objectives (PEOs) describe the expectations of our graduates after a few years of work experience by contributing to the society through modern technologies and practices. The following are the objectives:

1. To produce graduates who possess knowledge of computer engineering principles and techniques, enabling them to solve complex problems and contribute to technological advancements.
2. To create experts who are equipped with the skills necessary to identify opportunities, innovate, and transform ideas into successful ventures in the computer engineering industry.
3. To evolve researchers that cultivate cultures of research and innovation, and encourage to engage in cutting-edge research and development of novel solutions to address the evolving challenges of the modern world.
4. To have engineers who can work effectively in multidisciplinary teams, communicate ideas clearly, and uphold the highest professional and ethical standards.
5. To produce graduates with practical experiences, mentorship, and opportunities for professional growth, enabling them to make a significant impact on society and

shape a better future through the power of computer engineering..

Students obtaining the honours degree in Computer Engineering will receive a thorough background in various aspects of the field including Electrical Circuit Theory, Electrical Machines, Analogue Systems, Computer Architecture and Organization, Numerical Computation, Software Design Techniques, System Analysis and Design, Digital Systems Design, Embedded System, Intelligent Systems Design, Data Communications and Networks among many other courses.

5.0 PROGRAMME OUTCOMES (POs)

According to the Washington Accord Graduate Attributes adopted by the Washington Accord signatories, an engineer who is trained based on these attributes listed, can design solutions for complex problems based on the development of engineering activities that involve some or all the programme learning outcomes detailed below. These POs are the measurable statements that describe knowledge or skills that our students would achieve upon completion of their 5 Years Academic Program. All 12 POs defined in the COREN manual are encompassed in the POs of the Department.

PO1 - Engineering Knowledge

Competent Computer Engineering graduates emerge by designing the program to inculcate into students' application of

knowledge of mathematics, engineering fundamentals, and engineering principles to solve complex engineering problems.

PO2 - Problem Analysis

Upon completion of the program, graduates of Computer Engineering are produced by impacted on the students the ability to identify, formulate, conduct research literature, and analyse complex software engineering problems in order to accomplish proven conclusions using first principles of mathematics, natural and engineering sciences and principles.

PO3 - Design/Development of Solutions

In order to produce certified graduate engineers, students are equipped with methodology of designing solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4 – Investigation

By the end of 5-year computer engineering program, there would be evidences that students have been groomed to conduct investigation of complex engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5 - Modern Tool Usage

Graduate of computer engineering after 5-year training would have acquired the skills to create, select and apply appropriate techniques, resources, and modern engineering and IT tools,

including prediction and modelling, to solve complex engineering problems, with an understanding of the limitations.

PO6 - The Engineer and Society

Engineering graduates are expected to know how to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.

PO7 - Environment and Sustainability

Upon graduation, students would have understood how to evaluate sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.

PO8 - Ethics

Engineering students after 5-year program are expected to know how to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9 - Individual and Teamwork

One of the objectives of 5-year computer engineering program is to produce graduate that can function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

PO10 - Communication

A graduate of computer engineering would have the ability to communicate effectively on complex engineering activities

with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 - Project Management

The computer engineering program is designed to produce graduate that demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.

PO12 - Life Long Learning

Computer engineering students upon graduation would recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

6.0 ADMISSION REQUIREMENTS

Admission into the programme is either through Unified Tertiary Matriculation Examination (UTME) into the 100 level or Direct Entry into the 200 level.

A. Unified Tertiary Matriculation Examination (UTME)

Admission to 100 Level is through the UTME of the Joint Admission Matriculation Board Examination in subjects such as English Language, Mathematics, Physics and Chemistry. To be eligible for admission, candidates must have a minimum of five credit pass in the General Certificate of Education (Ordinary

Level), or West African Senior Secondary Certificate Examination (WASSCE) or NECO, IJMB or it is equivalent at not more than two (2) sittings in the following subjects: Chemistry, Physics, Mathematics and English Language. UTME Subjects: English Language, Chemistry, Mathematics, Further Mathematics and Physics.

B. Direct Entry

In addition to the requirements specified above in (a), candidates seeking admission to the 200 Level must possess

i. National Diploma (ND) at Upper Credit Level or equivalent in Electrical and Electronics Engineering, Computer Engineering or related discipline from recognised institutions, or

ii. Good passes at the General Certificate of Education (Advanced Level), JUPEB or its equivalent in Chemistry, Physics and Mathematics.

C. Inter/Intra-faculty Transfer

A student in 200 or 300 level can change Department within/outside the faculty. This can be done by filling the "**CHANGE OF PROGRAMME/DEPARTMENT FORM**". The time to change Department is during the registration period in first or second semester of the student's 200 or 300 level.

Note:

All candidates for admission into the University must satisfy the University matriculation requirements of five (5) credit passes at the O-Level including English, Mathematics, Physic and

Chemistry.

D. **Inter University Transfer**

A student in 200 or above can change to Computer Engineering Programme in Elizade University from Another University. The student however must fulfill the following conditions:

i. The student must meet the O-Level requirement of minimum of five (5) credit passes including English, Mathematics, Physics and Chemistry.
ii. The student must present JAMB admission letter to the former school.
iii. The student must present transcript from the former school. The relevant courses in the Department that has been passed in the transcript will be waived for the student and the student will attend to the remaining course while starting his/her study from 200 Level.

7.0 PROGRAMME DURATION

The normal duration of the academic programme is five academic sessions for students admitted to the 100 - level through the UTME and four academic sessions for those admitted into 200 - level by Direct Entry. Students that fail to graduate at the end of normal academic sessions shall not be allowed to exceed a total of 15 semesters in the case of UTME students and 12 semesters in the case of Direct Entry students.

7.1 Transfer Within the University

If a student transfers from one Faculty to another, the transfer would be treated as if he/she is just being admitted into the University. As part of the requirement for graduation, the student has to take all the foundation/compulsory courses in the

new Faculty or Department. In that case, his/her stay in the new Faculty or Department should be 1.5 times the number of semesters required to complete a programme.

- When a student transfers from a science-based Faculty to another, the computation of his result in the new Faculty shall take cognizance of his previous CGPA in the new Department. The duration of the stay at the University will be what remains of the 1.5 times the number of semesters required to complete the programme as approved by the Senate.

- Where a student is transferring from an Engineering, science-based to Humanities, arts-based Faculty or vice-versa, the transfer shall be treated as if the student is just being admitted into the University. The CGPA of the student will not be transferred to the new Department. He or She will however be required to take all the foundation or compulsory courses in the new Department.

8.0 GRADUATION REQUIREMENTS

To be eligible for a degree of B.Eng. in Computer Engineering from Elizade University Ilara-Mokin, a candidate must:

- pass all prescribed core courses as well as University and School required courses and the electives;

- complete a minimum of 195 units if admitted through UTME and a minimum of 164 units, if by Direct Entry and obtain a CGPA of not less than 1.5; and

- Complete successfully all field projects, laboratory practical and industrial attachments. Direct Entry students are expected to register and pass the General Studies Courses required by the university, i.e., GST 101, 102, 104, 105 and 106. If they fail these courses, they must offer them formally as credit courses.

9.0 THE COURSE UNIT SYSTEM AND COMPUTATION OF CUMULATIVE GRADE POINT AVERAGE [CGPA].

The course units in the Department are organized on the course credit system per semester. A semester lasts for approximately 17 weeks, including the periods of registration and examinations provided that not less than 14 weeks are devoted to actual teaching. One credit unit is the equivalent of 15 contact hours of classroom teaching or 30 hours of laboratory work. Most of the course units in the Department carry the weight of 2 or 3 credit units, suggesting that they are taught for 30 or 45 hours in the semester or 2 or 3 hours periods per week. In courses with a strong practical component, this means that there are 15 hours of teaching and 45 hours of practical to qualify for 2 credit units or 30 hours of teaching and 45 hours of practical for 3 credit unit courses.

However, there are fewer 3 credit unit courses which suggests that more work is required to be done in 45 contact hours per semester or the equivalent in terms of practical and classroom teaching. At the end of each semester, a final examination is given to bring the course to a conclusion. The final examination in each course unit is weighted 60% of the component, while the

continuous assessment (CA) usually carries the weight of 40% of the total marks for the course. No student can pass a course unit if he/she fails to submit the continuous assessment (CA).

9.1 Pattern of Examination

Each course shall be examined at the end of the course. The examination shall be conducted as prescribed by the Senate. Each examination shall be 1-3 hours in duration. In addition, there may be a practical paper and/or an oral examination. There shall be continuous assessment of each course and this shall constitute a percentage of the formal grade.

9.2 Eligibility for Participation in Examination

All students who are registered for a course in a given semester are eligible to sit for an examination in that course EXCEPT for students in the following categories.

(a) A student who fails to attend 75% of lectures or practicals in the course.

(b) A student who is absent from the university for one semester without any official notification and permission. Such a student is deemed by the Senate to have withdrawn from the university.

The implementation of the cases listed above is subject to the Senate's approval on the recommendation of the faculty board.

9.3 Measurement of Performance

Performance in a course shall be measured in terms of:

a. The results of prescribed theory and practical examination;

b. Continuous assessment which shall constitute 40% of measured performance; and
c. Assessment of such essays, practical exercises and reports prescribed for each course.

9.4 Level of Performance

A student shall be recorded as having attained in a course a level of achievement graded as follows:

Level of Performance	**Rating**	**Credit Points per Unit**
A	70% - 100%	5 (Excellent)
B	60% - 69%	4 (Very Good)
C	50% - 59%	3 (Good)
D	45% - 49%	2 (Satisfactory)
E	44% - 40%	1 (Adequate)
F	0% - 39%	0 (Failure)

9.5 Calculation of Grade Point Average [GPA]

The overall performance of each candidate during an entire semester shall be determined using a weighted grade point average, obtained by awarding credit points in respect of each course multiplied by the numeral value of the grade obtained as follows:

Level of Performance	**Rating**	**Credit Points per Unit**
A	70% - 100%	5
B	60% - 69%	4
C	50% - 59%	3
D	45% - 49%	2

E	44% - 40%	1
F	0% - 39%	0

9.5.1 Definition of Term.

a. Student Workload: This is defined in terms of course units. One unit represents one hour of lecture or one hour of Tutorial or 2-4 hours of practical work per week throughout a semester. Thus, for example, a course in which there are 2 hours of lectures and 1hour of Tutorials per week is a 3 unit course.

b. Total Number of Units (TNU): This is the total number of course units carried by a student in a particular semester. It is the summation of the load Units on all courses carried during the semester. For example, A student who is carrying 6 courses of 3 units each has a TNU of 18 for that semester. No student shall be allowed to carry (i.e. register for) or be examined in more than 24 units in any particular semester.

c. Cumulative Number of Units (CNU): This is the summation of the total number of Units over all the semesters from the beginning to date. A student who is prone to repeating courses will finish (if he does not drop out) with a higher CNU than his non-repeating colleagues and will most likely require a longer time to complete the requirements for the award of Degrees.

d. Level of Performance Rating: This is the rating of grades obtained in terms of Credit points per load unit. The rating used is as follows:

Level of Performance	**Rating**	**Credit Points per Unit**

A	70% - 100%	5
B	60% - 69%	4
C	50% - 59%	3
D	45% - 49%	2
E	44% - 40%	1
F	0% - 39%	0

Based on the above, a student who obtained a grade of "A" in a 4-unit course has scored 20 Credit points, and one who obtained a grade of C in that course has scored 12 Credit points.

e. Total Credit Point (TCP): This is the sum of the products of the course units and rating in each course, for the entire semester period. For example, consider a student who took 4 courses of 5 units each. Let's say the grade obtained in the four courses was C.B.E.D. respectively. The TCP of this student is obtained as 5 x 3 + 5 x 4 + 5 x 0 + 5 x 2 = 45

f. Cumulative Credit Point (CCP): This is the summation of Total Credit Points over all semesters from beginning to date.

g. Grade Point Average (GPA): This is the total credit points (TCP) divided by the total units (TNU). For example, consider the student's scores referred to above. His TCP is 45, and of course, his TNU is 20 (4 courses at 5 units each, for the semester). The highest GPA that can be earned is 5.0 and that is when a student has earned a grade of "A" in every course during the semester. The lowest GPA obtainable is 0.0 and this would happen if the student has F all round during the semester

h. Cumulative Grade Point Average (CGPA): This is the summation of TCPs for all semesters, divided by the summation

of TNU s for the said semesters. Like the GPA, CGPA obtained ranges from 0 to 5.

9.5.2 GPA and CGPA Sample Computations

Sample Computations: Consider a student who has enrolled for his/ her 100level courses, and has just completed 2 full semesters in the University, His/ Her GPA and CGPA could be computed as follows (Table 1).

Table 1a: Example of CGPA Computation for First Semester

Course Code	Course Title	Units	Exam. Score	Rating	CP	TCP	TNU
ELP 101	Entrepreneurial Leadership I	2	75(A)	5	10	10	2
MTH101	General Mathematics I	3	35 (F)	0	0	10	5
PHY 101	General Physics I	3	60 (B)	4	12	22	8
PHY 103	Practical Physics I	1	87 (A)	5	5	27	9
CHM 101	General Chemistry I	3	67 (B)	4	12	39	12
CHM 103	Practical Chemistry I	1	78 (A)	5	5	44	13
GST 101	Communication in English I	3	45 (D)	2	6	50	16
GNE 101	Introduction to Computer Technology	3	88 (A)	5	15	65	19
GST 109	Use of Library, Study Skills & ICT Literacy	1	70 (A)	5	5	70	20
GST 111	Citizenship and Human Kinetics Education	2	50 (C)	3	6	76	22

Previous: TCP = 0, TNU = 0, GPA = 0.00; Current: TCP = 76, TNU = 22, GPA = 3.45

GPA = $\frac{TCP}{TNU} = \frac{0+76}{0+22} = 3.45$

Table 1b: Example of CGPA Computation for Second Semester

100-LEVEL: 2ND SEMESTER							
Course Code	**Course Title**	**Units**	**Examination Score**	**Rating**	**CP**	**TCP**	TNU
GNE 102	Engineer-in-Society	1	75(A)	5	5	5	1
GNE 104	Introduction to Computational Software	1	75(A)	5	5	10	2
GNE 106	Introduction to Engineering Drawing	1	60 (B)	4	4	14	3
MTH 102	General Mathematics II	3	87(A)	5	15	29	6
MTH 104	Vectorial Analysis	3	88(A)	5	15	44	9
CHM 102	General Chemistry II	3	67(B)	4	12	56	12
CHM 104	Practical Chemistry II	1	54(C)	3	3	59	13
PHY 102	General Physics II	3	78(A)	5	15	74	16

PHY 104	Practical Physics II	1	45(D)	2	2	76	17
PHY 106	Properties of Matter	1	56(C)	3	3	79	18
GST 102	Communication in English II	2	72(A)	5	10	89	20
GST104	Philosophy, Logic and Issues in Science of Human Existence	1	76(A)	5	5	94	21
ELP 102	Entrepreneurial Leadership II	2	63(B)	4	8	102	23

Previous: TCP = 76, TNU = 22, GPA = 3.45; Current: TCP = 102, TNU = 23, GPA = 4.43

CGPA = $\frac{76+102}{22+23}$ = 3.95

9.6 Release of Examination Results

a. At the end of each semester, a provisional list of successful candidates in the course examination shall be published by the Chief Examiner soon after the ratification of the recommendation of the Board of Examiners by the Faculty Board.

b. The proceedings of Boards of Examiners are confidential and are in no circumstances to be disclosed at any time to any candidates or to another unauthorized person.

c. However, without prejudice to Regulation (b) above, a student contesting a given grade after the release of results can appeal to the Vice-Chancellor, who shall cause the Head of Department to call for the affected paper of the candidate for re-marking. This shall be done after the payment of the prescribed fee.

d. The final results of candidates for the award of a degree shall be published by the Registrar after they have been approved by the Senate.

9.7 Withdrawal from The University

Students are considered withdrawn from the university when their case falls under any of the following:

a. Termination of Studentship: A student that fails to register for courses in two consecutive semesters is credited with 2 Number of Registration Information (NRI) and subsequently withdrawn from the University.

b. Poor Academic Performance: A student is considered to have automatically withdrawn from the university if he/she scores a Cumulative Grade Point Average [CGPA] that is less

than one in two consecutive semesters.

c. Voluntary Withdrawal: A student is also considered withdrawn when his/her application for voluntary withdrawal has been processed through all the statutory meetings for such a case.

d. Gross Misconduct: A student can also be considered for withdrawal through expulsion from the University when found guilty of gross misconduct by the University Administration. Offenses leading to such misconduct include examination malpractice and disobedience to the University authority through one of several misdemeanors.

9.8 Final Assessment and Classification

The final assessment of the student can be summarized as follows:

a. A student's workload is defined in terms of course units. One unit represents one hour of lecture or one hour of tutorial or 24 hours of practical work per week throughout a semester. All courses shall run for one semester or a full session of two semesters.

b. The final award and the class of the degree shall be based on the Cumulative Grade Point Average [CGPA] obtained by each candidate in all prescribed courses approved by the University. The final cumulative grade point average shall be calculated-on the basis of the total number of credit points and the total number of course units registered for during the student's programme. In the case of a failed course, the candidate must repeat the course at the next available opportunity. If the course is elective, the candidate may

substitute another course which is an elective, and shall not be required to pass the failed elective course. If the course is a restricted elective, substitution can only be made from the list of restricted electives. The failed grade would, however, be reflected in the transcript.

c. A candidate who scores a cumulative grade point average [CGPA] of less than 1.00 into consecutive semesters shall be required to withdraw from the University.

d. A candidate who has satisfactorily completed all requirements for the degree with an overall grade point average of not less than 1.50 shall be awarded the honours degree as follows:

I. First Class	**4.50 -5.00**
II. Second Class (Upper Division)	**3.50 -4.49**
III. Second Class (Lower Division)	**2.40 -3.49**
IV. Third Class	**1.50 -2.39**
V. Pass	**1.00 -1.49**

Passes in required units special electives is a requirement for graduation.

9.9 Student Registration on E-Portal

Visit the university URL with https://www.elizadeuniversity.edu.ng/ then click on the Student portal below the page or visit the student portal directly via https://student.elizadeuniversity.edu.ng/. Follow the instructions. Pay the school fee and register all the necessary

courses from the course list for the programme through https://student.elizadeuniversity.edu.ng/ portal

10.0 LIST OF COURSES

There are two categories of course list. The first list of courses for curriculum runs from 2019/2020 session to 2025/2026 session. The second contains the list of courses for curriculum runs from the 400 and 500 Level 2021/2022 session to 2022/2023 session.

10.1 List of courses curriculum runs from 2020/2021 session to 2025/2026 session.

100-Level 1st Semester

Course Code	Course Title	ST	L	T	P	U
MTH 101	General Mathematics I	C	2	1	0	3
PHY 101	General Physics I	C	2	1	0	3
PHY 103	Practical Physics I	C	0	0	3	1
CHM 101	General Chemistry I	C	2	1	0	3
CHM 103	Practical Chemistry I	C	0	0	3	1
GNE 101	Introduction to Computer Technology	C	2	0	3	3
GST 101	Communication in English I	C	2	0	0	2
GST 109	Use of Library Study Skills & ICT Literacy	C	1	0	0	1
GST 111	Citizenship and Human Kinetics Education	E	1	0	0	1
	Total		**11/12**		**9**	**17/18**

**U - Unit, ST – Status, L – Lecture Hour(s), T – Tutorial Hour(s), P – Practical Hour(s)*

3 practical hours is equivalent to 1 unit, 1 lecture hour and 1 tutorial hour are 1 unit each

Core (C) = 19 .0 Elective (E) = 1

100-Level 2nd Semester

Course Code	Course Title	ST	L	T	P	U
GNE 102	Engineer–in–Society	C	1	0	0	1
GNE 104	Introduction to Computational Software	C	0	0	3	1
GNE 106	Introduction to Engineering Drawing	C	0	0	3	1
MTH 102	General Mathematics II	C	2	1	0	3
MTH 104	Vectoral Analysis	C	2	0	0	3
CHM 102	General Chemistry II	C	2	1	0	3
CHM 104	Practical Chemistry II	C	0	0	3	1
PHY 102	General Physics II	C	2	1	0	3
PHY 104	Practical Physics II	C	0	0	3	1
PHY 106	Properties of Matter	C	1	0	0	1
GST 102	Communication in English II	C	2	0	0	2

GST 114	Philosophy, Logic and Issues in Science of Human Existence	E	1	0	0	1
	Total		**12/13**	**3**	**12**	**20/21**

200-Level 1st Semester

Course Code	Course Title	ST	L	T	P	U	PR.
GNE 251	Engineering Drawing I	C	1	0	6	3	-
GNE 253	Engineering Mathematics I	C	2	1	0	3	MTH 101
GNE 255	Applied Mechanics	C	2	0	3	3	-
GNE 257	Fundamentals Electrical Engineering I	C	2	1	0	2	-
GNE 259	Materials Science	C	2	1	0	3	-
GNE 297	Fundamentals Electrical Engineering Laboratory I	C	0	0	3	1	
GST 215	Entrepreneurship I	C	2	0	0	2	
GST 205	Nigeria Peoples and Culture	E	0	0	0	1	
CSC 201	Computer Programming I	C	2	0	3	3	-
	Total			**3**		**21**	

**PR. – Prerequisite course*

200-Level 2nd Semester

Course Code	Course Title	ST	L	T	P	U	PR
GNE 252	Workshop Practice	C	1	0	3	2	-
GNE 254	Engineering Mathematics II	C	2	1	0	3	MTH 102
GNE 256	Fundamental of Fluid Mechanics	C	2	0	0	2	PHY 106
GNE 258	Fundamentals Electrical Engineering II	C	2	0	0	2	GNE 257
GNE 260	Strength of Materials I	C	2	0	3	3	-
GNE 262	Fundamentals of Thermodynamics	C	2	0	0	2	-
GNE 296	Fundamentals of Fluid Mechanics Laboratory I	C	0	0	3	1	
GNE 298	Fundamentals Electrical Engineering Laboratory II	C	0	0	3	1	
CPE 252	Introduction to Digital Systems	C	2	0	0	2	-
GST 210	Introduction to Musicology	C	0	0	3	1	

GST 216	Entrepreneurship II	C	2	0	0	2	
GST 208	Peace & Conflicts Resolution	E	0	0	0	1	
GST 206	Environment and Sustainable Development	E	0	0	0	1	
	Total		**15**	**1**	**15**	**21**	

300-Level 1st Semester

Course Code	**Course Title**	**ST**	**L**	**T**	**P**	**U**	**PR**
GNE 351	Engineering Mathematics III	C	2	1	0	3	GNE253
EEE 351	Electromagnetic Fields	C	2	1	0	3	MTH103
EEE 355	Physical Electronics	C	2	1	0	3	-

EEE 357	Electric Circuits	C	2	0	3	3	GNE257
EEE 359	Analog Circuits & Devices	C	2	0	3	3	
CPE 351	Digital System Design with VHDL	C	2	0	0	2	CPE 252
CPE 353	Low Level Language Programming	C	2	0	3	3	-
CPE 355	Digital System Design Laboratory	C	0	0	3	1	-
	Total		**14**	**3**	**12**	**21**	

300 Level 2nd Semester

Course Code	**Course Title**	**ST**	**L**	**T**	**P**	**U**	**PR**
GNE 352	Engineering Mathematics IV	C	2	1	0	3	GNE 254

GNE 354	Engineering Communication	C	2	0	0	2	
EEE 354	Electromagnetic Waves	C	2	0	0	2	EEE 351
CPE 352	Computer Organization & Architecture	C	2	1	0	3	-
CPE 354	Computer Engineering Laboratory	C	0	0	6	2	-
CPE 356	Information System Analysis and Design	C	2	0	0	2	-
CPE 358	Operating System Principles	C	2	1	0	3	
CPE 360	Object-Oriented Programming	C	2	0	3	3	
	Total		**14**	**3**	**9**	**20**	

400-Level 1st Semester

Course Code	**Course Title**	**ST**	**L**	**T**	**P**	**U**	**PR**
GNE 451	Engineering Statistics	C	2	1	0	3	-
EEE 453	Control Systems I	C	2	0	0	2	
EEE 457	Communication Principles	C	2	1	0	3	-

CPE 451	Data Communications & Networks	C	2	0	3	3	-
CPE 453	Microprocessor System & Interfacing	C	2	1	0	3	CPE 352
CPE 455	Microprocessor Design Laboratory	C	0	0	6	2	-
CPE 457	Introduction to Artificial Intelligence	C	2	1	0	3	-
CPE 459	Data Structure and Analysis of Algorithms	C	2	0	0	2	
	Total		**14**	**5**	**9**	**21**	

400-Level 2nd Semester & Long Vacation

Course Code	**Course Title**	**ST**	**L**	**T**	**P**	**U**	**PREQ.**
CPE 200	Student Work Experience Programme (SWEP)	C	0	0	9	3	
CPE 300	SIWES I – Students Industrial Work Experience I	C	0	0	9	3	

CPE 400	SIWES II– Students Industrial Work Experience II	C	0	0	27	9	-
Total						**15**	

500 – Level 1st Semester

Course Code	Course Title	ST	L	T	P	U	PR
GNE 551	Engineering Law and Management	C	3	0	0	3	-
EEE 551	Digital Signal Processing	C	2	1	0	3	
CPE 551	Individual Project I with Seminar Presentations	C	0	0	9	3	-
CPE 553	Embedded Systems Design	C	2	0	3	3	CPE 455
CPE 555	Industrial Application Studies and Innovations	C	2	0	3	3	-
CPE 557	Artificial Neural Network and programming	C	2	0	0	2	
	One Elective Course	E	2	0	0	2	
	Total		**14**	**1**	**18**	**21**	

Elective Courses

Course Code	Course Title	ST	L	T	P	U	PR
CPE 561	Wireless Networks	E	2	0	0	2	CPE 451
CPE 563	Computer Graphics & Animation	E	2	0	0	2	-
CPE 565	Cryptography Principles & Applications	E	2	0	0	2	
EEE 571	Introduction to Mechatronics Design	E	2	0	0	2	

500-Level 2nd Semester

Course Code	Course Title	ST	L	T	P	U	PR
GNE 552	Engineering Economics and Valuation	C	2	1	0	3	-
CPE 552	Individual Project II with Seminar Presentations	C	0	0	9	3	-
CPE 554	Robotics & Automation	C	2	0	3	3	-

CPE 556	Modelling and Simulation	C	1	0	3	2	-
CPE 558	Digital Image Processing	C	2	1	0	3	-
CPE 564	Hardware Systems Studies	C	2	0	0	2	CPE 455
	Two (2) Elective Courses	E	4	0	0	4	
	Total		**14**	**1**	**15**	**20**	

Elective Courses

Course Code	**Course Title**	**ST**	**L**	**T**	**P**	**U**	**PR**
CPE 560	Mobile and Cloud Computing	E	2	0	0	2	CPE 451
CPE 562	Information Security Techniques	E	2	0	0	2	
CPE 566	Intelligent Systems Design	E	2	0	0	2	CPE 457
CPE 568	Human Language Processing and Applications	E	2	0	0	2	CPE 457
CPE 570	Project Management	E	2	0	0	2	
CPE 572	Cyberpreneurship & Cyber law	E	2	0	0	2	

10.2 List of courses for 400 and 500 Level curriculum runs from 2021/2022 session to 2022/2023**.**

400 – Level 1st Semester

Course Code	**Course Title**	**U**	**ST**	**L**	**T**	**PR**
GNE 415	Engineering Analysis	3	C	2	1	-
ECE 409	Data Communication & Network	3	C	2	1	-
ECE 411	Microprocessor System &Interfacing Control System	3	C	2	1	-
ECE 413	Assembly Language Programming	3	C	2	1	-
ECT 413	Artificial Neural Network	3	C	2	1	-
ECE 415	Prototyping Techniques	2	C	1	-	3
ECE 417	Cryptography Principles &Application	2	E	2	-	-
ECE 419	Laboratory Practicals in Computer Engineering	2	C	-	-	6
Total		**21**				

400-Level 2nd Semester

Course Code	Course Title **Students Industrial Work Experience Scheme**	U	ST	L	T	P
ECE 402	SIWES - Industry-Based Supervisors Assessment	4	C	-	-	-
ECE 404	SIWES - University Supervisor's Assessment	4	C	-	-	-
ECE 406	SIWES - Student's Report &Seminar Presentation	4	C	-	-	-
Total		**12**				

500 – Level 1st Semester

Course Code	**Course Title**	**U**	**ST**	**L**	**T**	**P**
GNE 501	Engineering Economics	3	C	2	1	
EEE511	Reliability& Maintainability of Electrical	2	C	2	-	-
EEE519	Digital Signal Processing	3	C	2	1	-
ECE 511	Computer Organization & Architecture	3	C	2	-	3
ECE 513	Embedded System Design	3	C	2	1	-
ECE 521	Digital System Design with VHDL	2	C	2	-	-
ECT 521	Cyberpreneurship & Media law	2	C	2	-	-
	Electives (3 Courses)	6	E	-	-	-
Total		**24**				

Electives: Students are required to take a minimum of two units from any of the optional courses:

Course Code	**Course Title**	**U**	**ST**	**L**	**T**	**P**
EEE531	Introduction to Nanotechnology	2	E	2	-	-

ECT 513	JAVA Technology & Programming	2	E	2	-	-
ECE 517	Digital Speech Processing II	2	E	2	-	-
ECE 531	Neural Network & Programming	2	E	2	-	-

500-Level 2nd Semester

Course Code	**Course Title**	**U**	**ST**	**L**	**T**	**P**
GNE 502	Engineering Management	3	C	2	1	-
EEE532	Object Oriented Design & Programming	3	C	2	-	3
ECE 516	Software Development Techniques	3	C	2	-	3
ECT 524	Computer Graphics & Animation	2	C	2	-	-
ECE 526	Robotic & Automation	2	C	2	-	-
ECT 530	Computer Security Techniques	2	C	2	-	-
ECE 590	Project	6	C	-	-	-
ECE 598	Seminar	1	C	1	-	-
	Electives (1 Course)	2	E	-	-	-
Total		**24**				

Electives: Students are required to take a minimum of four units from any of the optional courses

Course Code	**Course Title**	**U**	**ST**	**L**	**T**	**P**
ECE 532	Digital Image Processing	2	E	2	-	-
ECE 534	Fuzzy Logic & Programming	2	E	2	-	-
ECE 536	System analysis & Simulation	2	E	2	-	-

11.0 COURSE SYNOPSIS

FACULTY OF SCIENCE COURSES

MTH 101 General Mathematics I (2-1-0=3 Units)

Course Content

Elementary set theory, subsets, union, intersections, complement, Venn diagrams. Real numbers; integers, rational and irrational numbers, mathematical induction, real sequences and series, theory of quadratic equations, binominal theorem. Complex numbers; algebra of complex numbers; the Argand Diagram. De Moivre's theorem, n^{th} roots of unity. Circular measure trigonometric functions of angles of any magnitude, addition and factor formulae.

Course Learning Outcome

i. define and explain set, subset, union, intersection, complements,
ii. demonstrate the use of Venn diagrams
iii. solve quadratic equations
iv. solve trigonometric functions
v. identify various types of numbers

vi. solve some problems using binomial theorem

MTH 102 General Mathematics II (2-1-0) = 3 Units

Course Content

Calculus: Function of a real variable, graphs, limits and idea of continuity. The derivative, as the limit of rate of change. Techniques of differentiation. Extreme curve sketching, Integration as an inverse of differentiation. Methods of integration, Definite integral. Application to areas. Volumes etc.

Course Learning Outcome

i. identify the types of rules in differentiation and integration
ii. recognise and understand the meaning of function of a real variable, graphs, limits and continuity
iii. solve some applications of definite integrals in areas and volumes
iv. solve function of a real variable, plot relevant graphs, identify limits and idea of continuity
v. identify the derivative as limit of rate of change
vi. identify techniques of differentiation and perform extreme curve sketching
vii. identify integration as an inverse of differentiation
viii. identify methods of integration and definite integrals

ix. perform integration application to areas, volumes.

MTH 104 General Mathematics IV (2-0-0) = 3 Units

Course Content

Vectors in Euclidean spaces, vector products, equation of lines and planes, element of vector calculus. General kinematics: momentum, angular momentum, fundamental equations of motion.

Course Learning Outcome

i. solve some vectors in addition and multiplication
ii. calculate force and momentum
iii. solve differentiation and integration of vectors.

CHM 101 General Chemistry I (2-1-0) = 3 Units

Course Content

Atoms, atomic structures, atomic theory, atomic spectra, Aufbau method, Hund's rule, Pauli Exclusion principles, Periodicity and periodic table, molecules, chemical equation and stoichiometry Rates of chemical reaction, energetics Thermochemistry and simple calculations involving Hess's law, Bonding and intermolecular forces, Hybridization and shapes of molecules (Valence Forces;

structure of Solids; molecular and ionic forces). Metals and extraction of metals, The Chemistry of selected metals and non- metals Chemical equilibrium reactions, Properties of gases, solutions, Redox reactions, Introduction to Electro-chemistry, electrolytic and galvanic cells, Fuel cells, electrode potential, half-cell equation. Faraday laws of electrolysis, Corrosion. Colligative properties, corrosion, Acid, Bases and salts, Introduction to Radioactivity.

Course Learning Outcome

i. define atom, molecules and chemical reactions
ii. discuss the modern electronic theory of atoms
iii. write electronic configurations of elements on the periodic table
iv. rationalise the trends of atomic radii, ionisation energies, electronegativity of the elements based on their position in the periodic table
v. identify and balance oxidation–reduction equation and solve redox titration problems
vi. draw shapes of simple molecules and hybridised orbitals
vii. identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship
viii. apply the principles of equilibrium to aqueous systems using LeChatelier's principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures

ix. analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy
x. determine rates of reactions and its dependence on concentration, time and temperature

CHM 102 General Chemistry II (2-1-0) = 3 Units

Course Content

Historical survey of the development and importance of organic chemistry, nomenclature and classes of organic compounds, Homologous series; isolation and purification of organic compounds; qualitative and quantitative- determination of empirical and molecular formulae, percentage purity, yield, organic chemistry; stereochemistry; determination of structure of organic compounds; Electronic theory in organic chemistry; Saturated hydrocarbons and Unsaturated hydrocarbons; alkenes, alkynes and aromatics. Functional group; carbonyls, halides, carboxylic acids and hydroxyl, Valence Forces; structure of Solids; molecular and ionic forces. The Chemistry of selected metals and non- metals–relative abundance.

Course Learning Outcome

i. state the importance and development of organic chemistry
ii. define fullerenes and its applications

iii. discuss electronic theory
iv. determine the qualitative and quantitative of structures in organic chemistry
v. state rules guiding nomenclature and functional group classes of organic chemistry
vi. determine the rate of reaction to predict mechanisms of reaction
vii. identify classes of organic functional group with brief description of their chemistry
viii. discuss comparative chemistry of group 1A, IIA and IVA elements
ix. describe basic properties of transition metals

CHM 103: Practical Chemistry I (0-0-3) = 1 Unit

Course Content

Calibration of Measuring Instrument; Standardization of HCl with Standard Sodium carbonate; Standardization of alkali with standard potassium hydrogen phthalate. Determination concentrations of commercial (H2SO+, HNO3, NaOH); Preparation of Sulphide of Copper and determination of its Empirical Formula.; Determination of the atomic weight of a metal by forming its Oxides; Determination of atomic weight of a metal from the volume of Hydrogen it displaced from an acid; preparation of double salts; determination of heat of neutralization; determination of Faraday's constant. Introduction of scientific techniques to local science in the environment.

Course Learning Outcome

i. state the general laboratory rules and safety procedures
ii. collect scientific data and correctly carry out chemical experiments
iii. identify the basic glassware and equipment in the laboratory
iv. state the differences between primary and secondary standards
v. perform redox titration
vi. record observations and measurements in the laboratory notebooks
vii. analyse the data to arrive at scientific conclusions

CHM 104: Practical Chemistry II (3-0-0)=3 Units

Course Content

Identification of elements in an organic compound Lassaigne: sodium fusion Test; Ignition Tests; Separation of mixtures, determination of Melting points; Re-crystallisation; Simple experiment reactions of Urea (carbamide); Test for aldehydes; Detection of carbonyl] group. Ignition test, Estimation of iron in ferrous ammonium sulphate using standardized potassium permanganate, Qualitative inorganic analysis.

Course Learning Outcome

i. state the general laboratory rules and safety procedures
ii. collect scientific data and correct carry out chemical experiments
iii. identify the basic glassware and equipment in the laboratory
iv. identify and carry out preliminary tests which include ignition, boiling point, melting point, test on known and unknown organic compounds
v. carry out solubility tests on known and unknown organic compounds
vi. carry out elemental tests on known and unknown compounds
vii. carry out functional group/confirmatory test on known and unknown compounds which could be acidic/basic/ neutral organic compounds.

PHY 101 General Physics I (2-1-0) = 3 Units

Course Content

Space and Time, frames of reference, Invariance of physical laws, relativity of simultaneity, relativity of time intervals, relativity of length, units and dimension; standards and units, unit consistency and conversions. Kinematics vectors and vector addition, components of vectors, unit vectors, products of vectors. Displacement, Time and average velocity, instantaneous velocity, average acceleration, motion with constant acceleration, freely falling bodies, position and velocity vectors, acceleration vector, projectile motion. Motion in a circle and relative velocity. Fundamental laws of mechanics:

forces and interactions, Newton's first law, Newton's second law, mass and weight, Newton's third law. Statics and dynamics: application of Newton's laws, dynamics of particles, frictional forces, dynamics of circular motion. Galilean invariance, universal gravitation, gravitational potential energy, elastic potential energy, conservative and non-conservative forces. Work and energy, kinetic energy and the work-energy theorem, power, momentum and impulse, conservation of momentum, collisions and momentum conservation, elastic collisions, centre of mass. Rotational dynamics and angular momentum, angular velocity and acceleration, energy in rotational motion, parallel axis theorem, torque, torque and rotation about a moving axis, simple harmonic motion and its applications. The simple pendulum, damped oscillations, forced oscillations and resonance.

Course Learning Outcome

i. identify and deduce the physical quantities and their units
ii. differentiate between vectors and scalars.
iii. describe and evaluate motion of systems on the basis of the fundamental laws of mechanics.
iv. apply Newton's laws to describe and solve simple problems of motion.
v. evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects.
vi. explain and apply the principles of conservation of energy, linear and angular momentum.
vii. describe the laws governing motion under gravity.

viii. explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

PHY 102 General Physics II (2-1-0) = 3 Units

Course Content

Electrostatics: Conservation law of electric charges, electrons and electrostatics, Coulomb's law, electric field and forces, electric field line, electric dipoles charged particles in an electric field, charge and electric flux, Gauss's law and its applications, electric potential, electric potential due to a single charge, electric potential due to a dipole, electric potential due to continuous charge distribution equipotential surfaces. Conductors and currents: electric current, resistors and resistance, electric power, capacitors in series and parallel, energy storage in capacitors and electric field energy, Gauss's law in dielectrics. Magnetism: magnetic field, magnetic field lines and magnetic flux, motion of a charged particles in a magnetic field, magnetic force on a current carrying conductor, Ampere's law, Biot-Savart law, electromagnetic induction, inductance, self-inductance, mutual inductance, Maxwell's equation, electromagnetic waves and oscillations.

Course Learning Outcome

i. explain the concepts of heat and temperature, and relate the temperature scales.

ii. define, derive and apply the fundamental thermodynamic relations to thermal systems.
iii. describe and explain the first and second laws of thermodynamics, and the concept of entropy.
iv. state the assumptions of the kinetic theory and apply techniques of describing macroscopic behavior.
v. deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium.
vi. describe and determine the effect of forces and deformation of materials and surfaces.

PHY 106 Properties of Matter (1-0-0)=1 Unit

Course Content

Molecular treatment of properties of matter, elasticity; Hooke's law. Young's shear and bulk moduli. Hydrostatics; Pressure; buoyancy. Archimedes principles. Hydrodynamics; Streamlines Bernoulli and continuity equations. Turbulence, Reynolds number. Viscosity; Laminar flow, Poiseuilles's equation. Surface tension; adhesion, cohesion, capillarity, drops and bubbles. Temperature; zeroth law of thermodynamics; heat; gas laws of thermodynamics; kinetic theory of gases Application.

Course Learning Outcome

i. Identify matter in the solid, liquid and gaseous state
ii. Identify and describe the properties of matter

iii. Describe quantitatively the molecular structure of solids, liquids and gases, relating their properties to the forces and distances between molecules and to motion of molecules
iv. Describe the relationship between motion of molecules and temperature

PHY 103 Practical Physics I (0-0-3) = 1 Unit

Course Content

This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experimental techniques will be employed. The experiments include: Mechanics: timing experiments, simple pendulum, compound pendulum, measurement of g, moments, determination of moment of inertia, measurement of viscosity, use of force board, law of momentum. Optics: reflection using plane mirror, convex/concave mirror, concave/convex lens, refraction using a prism, critical angle, apparent depth/real depth, simple microscope, compound microscope.

Course Learning Outcome

i. conduct measurements of some physical quantities
ii. make observations of events, collect and tabulate data
iii. identify and evaluate some common experimental errors

iv. plot and analyse graphs
v. draw conclusions from numerical and graphical analysis of data

PHY 104 Practical Physics II (0-0-3) = 1 Unit

Course Content

Electricity: Ohm's law, heating effect of a current internal resistance of a cell, Metre/Wheatstone bridge, potentiometer measurement of ece, plotting of magnetic field. Heat: measurement of specific capacity of water, and a solid, expansion of gas experiment using a long capillary tube, Joule's law. Sound: resonance tube, Sonometer.

Course Learning Outcome

i. conduct measurements of some physical quantities
ii. make observations of events, collect and tabulate data
iii. identify and evaluate some common experimental errors
iv. plot and analyse graphs
v. draw conclusions from numerical and graphical analysis of data
vi. prepare and present practical reports.

CSC 201 Computer Programming I (2-0-3)=3 Units

Course Content

An introduction to computer programing with emphasis on mathematical problems using python programing language or any other scientific programming language. Introduce students to computers, compilers and editors, and they are expected to write medium-sized programs. Implementation of concepts such as binding, scope, looping, branching, subprograms and parameter parsing, tasks and concurrency, heap management, exception handling, templates, inheritance and overloading.

Course Learning Outcome

i. describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems
ii. develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from Python, Java or C++
iii. use widely available libraries to prepare them for machine learning, graphics and design simulations
iv. develop skills in eliciting user needs and designing an effective software solution

v. recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services
vi. acquire capabilities that can further be developed to make them productively employable by means of short Internet courses in specific areas

GENERAL STUDIES COURSE (GST)

GST 101 Communication in English I (2-0-0) = 2 Units

Course Content

Introduction: the nature and functions of language, varieties and styles of English usage. Time Management. Study Skills; contemporary definition of literacy, introduction to the language skills. Vocabulary development: word formation, meaning relationships, register. Listening and Lecture Comprehension. Note -taking/note-making. Introduction to reading for Academic Purposes. Revision and test-taking skills.

Course Learning Outcome

i. identify possible sound patterns in English Language
ii. list notable language skills

iii. classify word formation processes
iv. construct simple and fairly complex sentences in English
v. apply logical and critical reasoning skills for meaningful presentations
vi. demonstrate an appreciable level of the art of public speaking and listening
vii. write simple and technical reports

GST 102 Communication in English II (2-0-0)= 2 Units

Course Content

Awareness raising: sources and types of writing errors. Grammatical structures: element of the sentence. Word, Phrase and Clause. Sentence types: classification by structure and function. The paragraph: definition and characteristics, patterns of development. Varieties of writing: discourse types, writing formats. The Mechanics of writing. The academic writing process.

Course Learning Outcome

i. Identify possible sources and types of writing errors
ii. Demonstrate ability to effectively construct technical report.
iii. Demonstrate ability to present oral written reports to wide variety of audience.

GST 109 Use of the Library and Information Literacy

(2-0-0)=2 units

Course Content

Definition and types of library. Example of a library set up (introduction to the EUIM library). Organization of a library. Forms of recorded information: print, non-print and electronic forms. Reference sources and services. Serials and periodicals. Use of ICT in the library. Internet applications: e-resources, social media networks, databases. Virtual libraries. Organization and retrieval of knowledge. The library catalog. Classification schemes. Introduction to report writing. Search strategies, referencing. Referencing styles.

Course Learning Outcome

i. describe the different library set up
ii. identify the different forms of recorded information
iii. use the virtual library
iv. use the library catalogue
v. search for books and other materials relevant for intended research
vi. describe the organisation of a library

GST 111 Citizenship and Leadership Education

(1-0-0)=1 unit

Course Content

Citizenship, qualities of a good citizen. Human rights, limitations to citizen's rights, protection of citizens' rights, duties and obligations: duties of citizens, obligations of citizens to the state. Moral principles and moral obligations, Drugs and medicines, drug abuse and its effects, drugs and health care, prescription and compliance, natural medicines and ethno therapy. Family life education: reproductive health, harmful health, practice safe motherhood, relationships and sexual behavior. Concepts of health and disease: concepts of well-being and disease, disease causation, HIV/AIDS, transition, prevention and control, stigmatization of responsibility, types of leadership, leadership and political power; Goal setting, vision and mission, Delegation of duties.

Course Learning Outcome

i. Identify the qualities of a good citizen
ii. Identify human right, the limitation, duties and obligations
iii. Explain family life education
iv. Identify the effect of drug abuse on human health

v. Explain the concept of health and disease
vi. Identify the different types of leaders and political power

GST 114 Philosophy and Logic (1-0-0)=1 unit

Course Content

Philosophy as a rational enquiry, branches of philosophy, school of thought in western philosophy, African philosophy. The nature of logic, basic symbolic logic, types of argument. Fallacies. Ethics. Metaphysics, metaphysical problems. Socio-political philosophy. justice and the state.

Course Learning Outcome

i. analyse philosophical arguments
ii. articulate key philosophical concepts
iii. apply ethical frameworks
iv. engage in rational inquiry

GST 118: Basic Communication in French (1-0-0) = 1 Unit

Course Content

Introduction to French, Alphabets and numeracy for effective communication (written and oral), Conjugation and simple sentence construction based on communication approach, Sentence construction, Comprehension and reading of simple texts.

Course Learning Outcome

i. communicate effectively in basic French
ii. conjugate verbs and construct simple sentences
iii. comprehend and analyze simple texts
iv. utilize numeracy in context

GST 205 Nigerian People and Cultures (1-0-0)=1 unit

Course Content

Introduction to Nigerian history, Introduction to Nigerian culture. Sources of Nigerian history. Culture and socialization. Primitive science and technology. Traditional religion and belief systems, Penetration of Christianity and Islam. Traditional political structures and administration. Modern day politics and culture. Culture and economic development. Traditional financial institutions. Festival and ritual in Nigerian culture. Festival as drama. Understanding the People/Cultures of Nigeria

through their Art. The role of museums. Nigeria literature. The quest for appropriate technology. Cultural revival.

Course Learning Outcome

i. analyse the historical foundation of Nigerian cultures and arts in pre-colonial times.
ii. identify and list the major linguistic groups in Nigeria.
iii. explain the gradual evolution of Nigeria as a political entity.
iv. analyse the concepts of trade and economic self-reliance of Nigerian peoples in relation to national development.
v. enumerate the challenges of the Nigerian state regarding nation building.
vi. analyse the role of the judiciary in upholding fundamental human rights.
vii. identify the acceptable norms and values of the major ethnic groups in Nigeria.
viii. list possible solutions to identifiable Nigerian environmental, moral and value problems.

GST 206 Environment and Sustainable Development

(1-0-0)=1 Unit

Course Content

Man – his origin and nature; Man and his cosmic environment; Scientific methodology, Science and technology in the society and service of man. Renewable and non-renewable resources – man and his energy resources. Environmental effects of chemical plastics, Textiles, Wastes and other materials, Chemical and radiochemical hazards, Introduction to the various areas of science and technology. Elements of environmental studies.

Course Learning Outcome

i. understand human origins and nature
ii. apply scientific methodology
iii. evaluate the impact of science and technology
iv. analyze environmental issues

GST 208 Peace and Conflict Resolution (1-0-0)=1 Unit

Course Content

Basic Concepts in peace studies and conflict resolution; Peace as vehicle of unity and development; Conflict issues; Types of conflict, e. g. Ethnic/religious/political/ economic conflicts; Root causes of conflicts and violence in Africa; Indigene/settler phenomenon; Peace – building; Management of conflict and security. Elements of peace studies and conflict resolution; Developing a culture of

peace; Peace mediation and peace-keeping; Alternative Dispute Resolution (ADR). Dialogue/arbitration in conflict resolution; Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc.

Course Learning Outcome

i. identify and analyze conflict types
ii. understand peacebuilding and conflict management
iii. apply alternative dispute resolution (adr) techniques
iv. assess the role of international organizations

GST 210 Introduction to Musicology (0-0-3)=1 Unit

Course Content

Elements of music; rhythm combination and extension. Choral singing, ensemble work and special instrument (including voice).

Course Learning Outcome

i. understand of the history and development of music, including different musical styles, genres, and traditions, and their social, political, and cultural contexts.

ii. analyse and interpret musical works and performances from different periods and cultures, using a range of critical and analytical methods.
iii. appreciate of the diversity of musical expression and an understanding of how different musical traditions and practices are shaped by cultural, technological, and ideological factors.
iv. evaluate and critique musical works and performances, and to contribute to ongoing debates and discussions within the field of musicology.
v. develop of strong research skills, including the ability to conduct original research, collect and analyze data, and present findings in a clear and compelling way.

GST 215 Entrepreneurship I (2-0-0)=2 units

Course Content

Introduction to entrepreneurship and new venture creation. Theory of entrepreneurship. Types of business organization. Initiating enterprises. Sources of finance/raising capital cost. Budgeting techniques and financial planning. Managerial functions with special emphasis on staffing. Marketing and the new venture. Accounting and special tax problems. Insurance issues in business. Environmental impact considerations. Student's business proposal.

Course Learning Outcome

i. explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation and risk-taking.
ii. state the characteristics of an entrepreneur.
iii. analyse the importance of micro and small businesses in wealth creation, employment generation and financial independence.
iv. engage in entrepreneurial thinking.
v. identify key elements in innovation.
vi. describe the stages in enterprise formation, partnership and networking, including business planning.
vii. describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world.

GST 216 Entrepreneurship II (2-0-0)=2 units

Course Content

Photography, 2D & 3D animation & motion graphics, Bead making, event planning and management, Fashion designing, Tying and Dyeing/Adire Fabrics, Shoe & Bag making, Make-up and gele.

Course Learning Outcome

i. demonstrate ability to effectively handle event pictures.

ii. demonstrate ability to use photoshop.
iii. demonstrate ability to effectively plan and manage events.
iv. demonstrate ability to make shoes.
v. develop skills for fashion designing.

FACULTY OF ENGINEERING COURSES

GNE 101 Introduction to Computer Technology

(2-0-3 = 3 units)

Course Content

History of Computers; functional components of a computer; characteristics of a computer system. Definition of computer science. History of computer science and their generations, Computer Hardware; Modern I/O units. Software: Operating Systems, Application Packages Program: Development; Flowcharts and Algorithms; Program Object; VISUAL BASIC programming language serves as the vehicle to illustrate the many concepts.

Course Learning Outcome

i. narrate the history of computer

ii. list components of a computer and their functions
iii. identify the characteristics of a computer system.
iv. identify and differentiate the use computer hardware and computer software
v. run application package programs
vi. develop flowcharts and algorithms for a problem
vii. solve interactive problems using Python programming language in Processing environment.

GNE 102 Engineer-in-Society (1-0-0) = 1 Unit

Course Content

Philosophy of Science and Engineering. History of Engineering and Technology. The Engineering profession - engineering - engineering literacy professional bodies and engineering societies. Engineers' code of conduct and ethics. Engineers and Nation Building - economy, politics, business, safety in Engineering and introduction to Risk Analysis. Case studies from invited professionals.

Course Learning Outcome

i. differentiate between science, engineering and technology, and relate them to innovation.
ii. distinguish between the different cadres of engineering – engineers, technologists, technicians and craftsmen and their respective roles and competencies.

iii. identify and distinguish between the relevant professional bodies in engineering.
iv. identify and evaluate safety and risk analysis in engineering practice.

GNE 104 Introduction to Computational Software

(0-0-3=1 Unit)

Course Content

This course covers the introduction and applications of commonly used computational software packages. Overview of Computational Software. Evolution and trends in Computational Software development. Using MATLAB as an example of computational Software. Introduction to MATLAB. Basic features of MATLAB. Creating MATLAB variables; managing MATLAB workspace; MATLAB mathematical functions. Basic plotting; Matrix generation; Array operations and Linear equations. Introduction to programming in MATLAB. Control flow and operators. Debugging M-files. Introduction to other computational software packages: Ms Excel, Numpy and Pandas.

Course Learning Outcome

i. solve basics computational task with Matlab, MS Excel, Numpy and Pandas.
ii. explore basics of matlab, MS Excel, Numpy and Pandas.
iii. identify computational software.

GNE 106 Introduction to Engineering Drawing

(0-0-3 = 1 Unit)

Course Content

Introduction to drawing instruments, scales, draughting aids and their proper use. Size of paper and drawing layout. Dimensioning, line work, layout and lettering. Geometrical constructions and Engineering Graphics. Graphical Calculus and Applications. Circles and Tangents. Conic sections, various methods of their construction. Cycloid, epi and hypocycloids. Involute. Archimedes spiral. Loci: the helix (cylindrical and conical) single and multi-start threads. Introduction to projections.

Course Learning Outcome

i. recognition and mastery of the use of different drawing instruments.
ii. ability to prepare paper for drawing i.e., drawing of border lines and title blocks.
iii. ability to draw different kinds of geometrical shapes that will be encountered in the drawing of engineering components
iv. formation of perfect corners/bends/edges on engineering components.

GNE 251 Engineering Drawing I (1-0-6 = 3 Units)

Course Content

Development of geometrical figures and intersection of solids and curves. Projections – lines, planes and simple solids. Orthographic projections in first and third angles. Isometric Projection; sections and sectioning, auxiliary views and staggered sectioning. Pictorial/Freehand Sketching. Conventional practices with Simple examples, including threads and threaded fasteners, cam profiles and Assembly drawing from detailed components. Introduction to Computer Aided Drafting: Electronic draughting packages: principle and use in engineering design. Simulation packages: principle and use in engineering.

Course Learning Outcome

i. ability to present objects using different kind of projections such as isometric, oblique and orthographic projections.
ii. ability to do free hand sketching.
iii. ability to draw the isometric projection of an object from its orthographic projection and vice versa.
iv. knowledge of different kinds of fasteners used in fabrication of objects and their representations.
v. brief knowledge of draughting and simulation packages.

GNE 252 Workshop Practice (1-0-3= 2 Units)

Course Content

Safety procedure in workshop and Workshop setting; Types of workshop equipment, machines and materials; Use of instruments and tools (hand and machine tools), Measurement and marking out; Bench work and fitting; Machine operation practice. Carpentry: Hand tools and working principles; Joints and fastenings: bolt, rivet, welding, brazing, soldering. Invited lectures from Professionals.

Course Learning Outcome

i. identify various basic hands and machine tools, analogue and digital measurement devices and instruments, and acquire skills in their effective use and maintenance.
ii. practically apply basic engineering technologies, including metrology, metal forming and joining, materials removal, and machine tooling.
iii. master workshop and industrial safety practices, accident prevention and ergonomics.
iv. physically recognise different electrical & electronic components like resistances, inductances, capacitances, diodes, transistors and their ratings.
v. connect electric circuits, understand different wiring schemes, and check ratings of common household electrical appliances and their basic maintenance.

vi. determine household and industrial energy consumption, and understand practical energy conservation measures.

GNE 253 Engineering Mathematics I (2-1-0= 3 Units)

Course Content

Complex analysis – Elements of complex algebra, trigonometric, exponential and logarithmic functions. The real number, sequences and series. Composite functions, matrices and determinants. Vectors – Elements, differentiation and integration, Elements of linear algebra, Calculus – Elementary differentiation. Relevant theorems.

Course Learning Outcome

i. solve qualitative problems based on vector and matrix analyses such as linear independence and dependence of vectors, rank etc.
ii. describe the concepts of limit theory and nth order differential equations and their applications to physical phenomena.
iii. solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables.

iv. describe the applications of double and triple integration in finding the area and volume of engineering solids, and explain the qualitative applications of Gauss, Stoke's and Green's theorem..

v. explain ordinary differential equations and applications, and develop a mathematical model of linear differential equations, as well as appreciate the necessary and sufficient conditions for total differential equations.

vi. analyse basic engineering models through partial differential equations such as wave equation, heat conduction equation, etc., as well as fourier series, initial conditions and its applications to different engineering processes.

GNE 254 Engineering Mathematics II (2-1-0 = 3 Units)

Course Content

Differential equations – Exact Equations. Methods for second-order equations. Partial differential equation. Simple cases – Applications, Numerical Analysis – linear equations, non-linear equations. Transformation and mapping: special functions. Finite difference operators: Introduction to linear programming.

Course Learning Outcome

i. describe physical systems using ordinary differential equations (ODEs).
ii. explain the practical importance of solving ODEs, solution methods, and analytically solve a wide range of ODEs, including linear constant coefficient types.
iii. numerically solve differential equations using MATLAB and other emerging applications.
iv. perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion, as well as on functions of several variables, including directional derivatives and multiple integrals.
v. solve problems using the fundamental theorem of line integrals, Green's theorem, the divergence theorem, and Stokes' theorem, and perform operations with complex numbers.
vi. apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions of complex variables, as well as the theory of conformal mapping to solve problems from various fields of engineering.
vii. evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula

GNE 255 Applied Mechanics (2-1-0 = 3 Units)
Course Content

Forces, force resolution, moments, couples, Varignon's theorem. Equilibrium of simple structures and machine parts. Friction. First and second moments of area; centroids. Kinematics of particles and rigid bodies in-plane motion. Newton's laws of motion. Kinetic energy and momentum analyses.

Course Learning Outcome

i. explain the fundamental principles of applied mechanics, particularly equilibrium analysis, friction, kinematics and momentum.
ii. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, mathematics and applied mechanics.
iii. synthesize Newtonian Physics with static analysis to determine the complete load impact (net forces, shears, torques, and bending moments) on all components (members and joints) of a given structure with a load.
iv. apply engineering design principles to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

GNE 256 Fundamentals of Fluid Mechanics

(2-0-0 = 2 Units)

Course Content

Nature and types of fluids; Physical properties of fluids; Fluid statics, the stability of submerged and floating bodies; Fluid flow concept; conservation of mass, momentum energy; Simple applications of conservation laws; Flow measurement.

Course Learning Outcome

i. explain the properties of fluids.
ii. determine forces in static fluids and fluids in motion.
iii. determine whether a floating body will be stable.
iv. determine the effect of various instruments, (valves, orifices, bends and elbows) on fluid flow in pipes.
v. measure flow parameters with venturi meters, orifice meters, weirs, etc.
vi. perform calculations based on principles of mass, momentum and energy conservation.
vii. perform dimensional analysis and simple fluid modelling problems.
viii. specify the type and capacity of pumps and turbines for engineering applications.

GNE 257 Fundamentals of Electrical Engineering I

(2-0-0) = 2 Units

Course Content

The fundamental theory of electric circuits. Direct current (DC) circuit elements. Basic circuit laws and theorems—Ohm's Law, Kirchoff's Laws; Superposition, Thevenin and Norton's theorems. Nodal and loop analysis of circuits, single time-constant circuits. Steady-state response of circuit elements and network. Complex impedance and admittance. Alternating current (AC) circuits impedance, admittance, susceptance, and phasor diagrams. Introduction to electronics, an overview of tubes (vacuum diode, triode and pentode). Elementary discussion of semiconductors PN junction diode and Bipolar Junction Transistor. Small signal equivalent circuits.

Course Learning Outcome

i. discuss the fundamental concepts of electricity and electrical d.c. circuits
ii. state, explain and apply the basic d.c. circuit theorems
iii. explain the basic a.c. circuit theory
iv. apply to solution of simple circuits

GNE 258 Fundamentals of Electrical Engineering

(2-0-0) = 2 Units

Course Content

Periodic waveforms and their average and effective values. Characteristics and use of non-linear elements in simple circuits. Magnetic circuits, single-phase alternating current (AC) circuits. Series and parallel resonance. Power factor correction, magnetic circuit, mutual inductance. Introduction to electric machines, machine designs, and polyphase systems; DC generators and motors. Electrical and electronic power measuring instruments and equipment, AC and DC bridges. A basic control system, span/closed loop system. Introduction to basic communication fundamentals.

Course Learning Outcome

i. use computational tools and packages in the design of electric power systems, electronic, and digital equipment and systems.
ii. solve common, technical problems in the design of electronics and electrical circuits including electric power systems, and seek specialist advice as needed for more complicated problems.
iii. identify the process of innovation and the main factors of entrepreneurship and creative thinking, and apply methods of product development.
iv. apply project management methods to the planning of projects.
v. plan, manage and analyse projects, using current best-practice methods.

vi. carry out a cost estimate for a design solution, and understand the uncertainties associated with the cost estimation process.

GNE 259 Materials Science (2-0-3) = 3 Units

Course Content

Review of properties of matter, relationships between structure and properties of metals, alloys, ceramics and plastics. Atomic and molecular structure, crystals, Metallic states, Defects in crystals, conductors, semiconductors and insulators. Alloy theory – Application to industrial alloys – steel in particular. Engineering Properties – Their control, Hot and cold working, heat treatment, etc. Creep, fatigue and fracture. Corrosion and corrosion control. Non-metallic materials – glass, rubber, concrete, plastics, wood and ceramics. Elastic and plastic deformations: Defects in metals.

Course Learning Outcome

i. demonstrate the role of atoms and molecules (aggregates of atoms) in the building of solid/condensed matter known as engineering materials, the electrons quantum numbers and how the electrons are arranged in different atomic elements, and explain the role of electronic configuration and valence electrons in bonding.

ii. define metals, alloys and metalloids, demonstrate mental picture of the solid mineral resources development as a relay race among four 'athletes': geologist, mining engineer, mineral processing technologist, process metallurgical engineer, and classify metallurgical engineering into 3Ps: process, physical and production.
iii. explain the relationship between structure and properties of materials, characteristics, components and compositions of phase diagrams and phase transformations of solid solutions.
iv. define ceramics, glass and constituents of glasses and understand application of ceramics in mining, building, art and craft industries.
v. define and classify polymers as a class of engineering materials and polymeric materials, demonstrate polymerisation reactions, their types and mechanism, and applications of polymers.
vi. define properties, types and application of composite materials and fibres (synthetic and natural).
vii. define and classify nanomaterials, demonstrate applications of nanomaterials, concept, design and classification of fracture mechanics, corrosion classification, including the five principal ways of controlling corrosion and metal finishing processes such as sherardising, galvanising and anodizing.

viii. identify factors affecting the performance and service life of engineering materials/metals and metallography of metals/materials (materials anatomy), which enables metallurgical and materials engineers to prescribe appropriate solutions to test metals/materials fitness in service through structure-property-application relationships.

GNE 260 Strength of Materials I (2-0-3) = 3 Units

Course Content

Hooke's law; Method of superposition; Stress and deformation resulting from temperature changes; Elastic Constants; Stress in thin cylinders and spheres; Stresses on inclined planes. Principal stresses Mohr's circle. Structural mechanics of statistically determinate rigid body systems and plane pin-jointed frames; Bending moment and shear force in beams, Simple beam and deflection of beam, truss and elastic buckling of columns; Simple torsion and application; Stress and strain transformation equations.

Course Learning Outcome

i. recognise a structural system that is stable and in equilibrium.
ii. determine the stress-strain relation for single and composite members based on Hooke's law.
iii. estimate the stresses and strains in single and composite members due to temperature changes.

iv. evaluate the distribution of shear forces and bending moments in beams with distributed and concentrated loads.
v. determine bending stresses and their use in identifying slopes and deflections in beams.
vi. use Mohr's circle to evaluate the normal and shear stresses in a multi-dimensional stress system and transformation of these stresses into strains.
vii. evaluate the stresses and strains due to torsion on circular members.
viii. determine the buckling loads of columns under various fixity conditions at the ends.

GNE 262 Fundamentals of Thermodynamics

(2-0-0) = 2 Units

Course Content

Basic concepts, quantitative relations of Zeroth, first (applications to open and closed systems; The steady State flow/ Bernoulli's equation and applications), second and third laws of thermodynamics. Behavior of pure substances and perfect gases; Ideal gas cycles.

Course Learning Outcome

i. describe basic concepts of thermodynamics, quantitative relations of Zeroth, first, second and third laws.

ii. define and explain system (surrounding, closed and open system), control volume and control mass, extensive and intensive properties.

iii. calculate absolute and gage pressure, and absolute temperature, calculate changes in kinetic, potential, enthalpy and internal energy.

iv. evaluate the properties of pure substances i.e. evaluate the state of the pure substances such as compressed liquid, saturated liquid-vapour mixture and superheated vapour using property diagrams and tables; arrange the ideal and real gas equations of state.

v. formulate the first law of thermodynamics for a closed system i.e. organize the change in energy in the closed systems via heat and work transfer.

vi. distinguish heat transfer by conduction, convection and radiation, and calculate the amount of heat energy transferred.

vii. calculate the changes in moving boundary work, spring work, electrical work and shaft work in closed systems

viii. apply the first law of thermodynamics for closed systems and construct conservation of mass and energy equations.

ix. formulate the first law of thermodynamics to the open systems i.e. describe steady-flow open system, apply the first law of thermodynamics to the nozzles, diffusers, turbines, compressors, throttling valves, mixing chambers, heat exchangers, pipe and duct flow.

x. construct energy and mass balance for unsteady-flow processes.
xi. evaluate thermodynamic applications using second law of thermodynamics.
xii. calculate thermal efficiency and coefficient of performance for heat engine, refrigerators and heat pumps.
xiii. restate perpetual-motion machines, reversible and irreversible processes.

GNE 296 Fundamentals of Fluid Mechanics Laboratory I

(0-0-3 = 1 Unit)

Course Content

Determination of fluid properties. Pressure measurement. Hydrostatic force on a plane surface. Determination of metacentric height. Determination of stability of floating bodies. Verification of Bernoulli's theorem.

Course Learning Outcome

i. utilize basic measurement techniques of fluid mechanics.
ii. discuss the differences among measurement techniques, their relevance and applications.
iii. measure fluid pressure and relate it to flow velocity.
iv. demonstrate practical understanding of the various equations of bernoulli.

v. demonstrate practical understanding of friction losses in internal flows.
vi. demonstrate the ability to write clear lab reports.

GNE 297 Fundamentals of Electrical Engineering Laboratory I
(0-0-3 = 1 Unit)

Course Content

Identification of resistors and resistor colour coding, Series connections, Parallel connections, Verification of Ohm's law, Verification of Kirchhoff's Voltage Law, Verification of Kirchhoff's Current Law, Loop analysis, Verification of Thevenin's Theorem, Experiment to verify Norton's theorem, Superposition Theorem.

Course Learning Outcome

i. identify resistors and resistor colour coding.
ii. experimentally verify the basic circuit theorems.
iii. measure power and power factor in ac circuits.
iv. design and experiment potential diver circuits.

GNE 298 Fundamentals of Electrical Engineering Laboratory II

(0-0-3 = 1 Unit)

Course Content

Alternating current waveforms: Sine wave, square wave and triangular waveforms, RLC Series Circuits, RLC Parallel Circuits, Half wave rectification Circuit, Full wave rectification Circuit, Design and Construction of Monostable Multivibrator, Design and Construction of Astable Multivibrator, Design and Construction of Bistable Multivibrator, Series and parallel Resonant Circuits, Design and Construction of filters.

Course Learning Outcome

i. demonstrate practical proficiency in alternating current waveforms
ii. design and construction of monostable multivibrator,
iii. design and construction of astable multivibrator,
iv. design and construction of bistable multivibrator, series and parallel resonant circuits,
v. design and construction of filters.

GNE 351 Engineering Mathematics III (2-1-0=3 units)

Course Content

Fourier series – Euler coefficients, even and odd functions, Sine and Cosine, functions, simple applications, Gamma, Beta and probability functions. Differential equation of second order– series solutions. Legendre and Bessel functions and their properties. Vector Theory – Dot product, cross product, divergence, curl and Del operators. Gradient. Line, Surface and volume integrals and related theorems.

Course Learning Outcome

i. possess an in-depth knowledge upon which a solid foundation can be built in order to demonstrate a depth of understanding in advanced mathematical topics.
ii. develop simple algorithms and use computational proficiency.
iii. write simple proofs for theorems and their applications.
iv. communicate the acquired mathematical knowledge effectively in speech, writing and collaborative groups.

GNE 352 Engineering Mathematics IV (2-1-0=3 units)
Course Content

Complex variables – advanced topics, differentiation and integration of complex functions. Cauchy – Riemann equations: Related theorems. Laplace and Fourier transform – Applications. Introduction to non-linear differential equations – stability and Applications.

Course Learning Outcome

i. relate integral transforms to solution of differential and integral equations.
ii. solve partial differential equations.
iii. solve second order differential equations.
iv. solve linear integral equations.
v. explain and apply interpolation formulas.
vi. apply Runge-Kutta and other similar methods in solving ODE and PDEs.

GNE 354 Engineering Communication (2-0-0) = 2 Units)

Course Content

Oral communication: Public speaking skills with the effective use of visual aids and statistical and technical information. Principles of effective communication in interpersonal and mass communication processes. Effective reading skills- extracting main ideas and reading for specific information through speed reading. Written communication: principles of technical writing.

Planning and experimental design; data collection and analysis; scientific writing and presentation. Grant writing and funding sources. Ethics and intellectual property. Professional use of English Language for letters, specification descriptions, presentation of charts, graphs, tables, writing of proposals in reports. Case studies of major engineering designs and construction/fabrication as well as industrial failures; seminar presentation of reports and proposals. Project report presentation.

Course Learning Outcome

i. demonstrate the concept of clear writing, common pitfalls and unambiguous language in engineering communication, including technical reporting for different applications and emotional comportment.
ii. demonstrate the skills of language flexibility, formatting, logic, data presentation styles, referencing, use of available aids, intellectual property rights, their protection, and problems in engineering communication and presentation.
iii. demonstrate good interpersonal communication skills through hands-on and constant practice on real-life communication issues for engineers in different sociocultural milieu for engineering designs, structural failure scenarios and presentation of reports.

GNE 451 Engineering Statistics (2-1-0 = 3 Units)

Course Content

Elements of statistics; Descriptive statistics, frequency distribution, populations and sample, central tendency, variance data sampling, mean, median, mode, mean deviation, percentiles etc. Probability. Binomial, poison hyper- geometric, normal distributions, etc. Statistical inference intervals, test hypothesis and significance. Estimating Engineering Quantities: Estimators Methods, Confidence Limits and Tolerance. Hypothesis testing; Statistical Inference and Engineering decision situations, operating characteristics curves, parametric and non-parametric tests of engineering data. Introduction to analysis of variance, regression. ANOVA, R-estimates, confidence intervals, correlation analysis. Statistical computer routines.

Course Learning Outcome

i. work with data from the point of view of knowledge convergence, machine learning, and intelligence augmentation, which significantly raises their standard for engineering analysis (the approach forces them to learn statistics in an actionable way that helps them to see the holistic importance of data analytics in modern engineering and technology).

ii. anticipate the future with Artificial Intelligence while fulfilling the basic requirements of conventional engineering statistical programming consistent with their future careers.

iii. perform, with proficiency, statistical inference tasks with language or programming toolboxes such as R, Python, Mathematica or MATLAB, and Design Expert to summarise analysis and interpretation of industry engineering data, and make appropriate conclusions based on such experimental and/or real-life industrial data.

iv. construct appropriate graphical displays of data and highlight the roles of such displays in data analysis, particularly the use of statistical software packages.

v. demonstrate mastery of data analytics and statistical concepts by communicating the results of experimental and industry-case investigations, critically reasoned scientific and professional analysis through written and oral presentation.

GNE 551 Engineering Law and Management

(3-0-0=3 Units)

Course Content

Law of contracts for Engineers: offer, acceptance, communication termination. General principles of criminal law. Law of torts: definition, classification and liabilities. Patents: requirements, application, and infringement. Registered designs: application, requirements, types and infringement. Company law. Labour law and Industrial Law

Principles of organization; elements of organization; management by objectives. Financial management, accounting methods, financial statements, cost planning and control, budget and budgetary control. Depreciation accounting and valuation of assets. Personnel management, selection, recruitment and training, job evaluation and merit rating. Industrial psychology. Resource management; contracts, interest formulae, rate of return. Methods of economic evaluation. Planning decision making; forecasting, scheduling. Production control. Gantt Chart, CPM and PERT. Optimization, linear programming as an aid to decision making, transport and materials handling. Raw materials and equipment. Facility layout and location. Basic principles of work study. Principles of motion economy. Ergonomics in the design of equipment and process.

Course Learning Outcome

i. know the science of fluid dynamics as well as computational fluid dynamics (cfd) and their importance to engineering applications.
ii. have a hands-on practical experience of how computational fluid dynamics (cfd) is carried out.

iii. apply the knowledge of computational fluid dynamics (cfd) to solve real-life engineering fluid flow problems.

GNE 552 Engineering Economics and Valuation

(2-1-0) = 3 Units

Course Content

Economics of business settings, costing of production systems. Objectives of cost analysis and control. Sources of finance, money and credit for projects. Investment Appraisals. Resource Allocation. Interest rates. Interest formulas and problems. Annual costs. Present worth, rates of return. Cost-reducing. Depreciation accounting. Valuation of assets. Financial management; accounting methods, financial statement, elements of costing. Budget and budgeting control. Dwelling with multiple alternatives, uncertainties, planning, and Decision-making procedures. Macroeconomics, Economic growth, National Income. Economic technological change. Economic analysis of engineering projects; value systems economic decisions on capital investments and choice of engineering alternatives; new projects, replacement and abandonment policies, risky decisions; corporate financial practices. Analysis of tender and project feasibility valuation.

Course Learning Outcome

i. student should be able to understand the basics of economics and finance.
ii. student should be able to perform cost analysis and control.
iii. student should be able to appraise investments.
iv. student should be able to allocate resources.
v. student should be able to make decisions under uncertainty.
vi. student should be able to analyse engineering projects.

ELECTRICAL ENGINEERING COURSES

EEE 351 Electromagnetic Fields (2-1-0)= 3 Units

Course Content

Review of electric fields and magnetic fields. Static field vs time-varying fields. Separation vectors. Electromagnetic laws in differential and integral forms – separation vectors, Coulomb's law, electrostatic fields due to point charges, multiple-point charges and various charge distributions. Gauss law, boundary condition, electric potential, Laplace, and Poisson equations. Magnetostatic fields, magnetostatic induction, Biot-Savart's law, magnetic flux, field strength, vector potential, magnetic field in and around current carrying conductors, conduction and displacement current. Ampere's law. Faraday's law. Lorentz law. Application examples - application of electromagnetic

effects to DC & AC machines, communication and micromechanical systems. Introduction to Maxwell's equations. Design project.

Course Learning Outcome

i. apply maxwell's equations to solve problems involving electric and magnetic fields.
ii. design and analyze electrical and electronic circuits
iii. explain the operation of electromagnetic devices.
iv. apply electromagnetic principles to communication systems.
v. analyze the electromagnetic effects of materials.
vi. solve problems involving electromagnetic radiation.

EEE 354 Electromagnetic Waves (2-0-0)= 2 Units

Course Content

Time-varying magnetic and electric fields; Maxwell's equation (in rectangular coordinates and vector-calculus notation): Derivation of Maxwell's equations; Applications of Maxwell's equations. Dielectric, conductors and ionized media. Propagation of electromagnetic waves in free space and in material media. Solution of wave equations. Speed and energy of electromagnetic waves; Poynting vector; boundary conditions, uniqueness theorem, image method. Wave propagation in dielectric

media; wave propagation in good conductors, skin effect. Simple class demonstrations. Introduction to transmission lines, wave-guides and optic fibers. Transmission line theory including wave-guides, striplines, and resonators. Smith's Chart. Radiating elements. Introduction to RF design, antenna design and theory. Application examples that employ electromagnetic phenomena for signals and power transmission in RF, microwaves, optical and wireless communication systems. Design project.

Course Learning Outcome

i. understand the behavior of electromagnetic waves in free space and in material media.
ii. analyze wave propagation in dielectric media and good conductors.
iii. explain the operation of transmission lines, waveguides, and optical fibers.
iv. design and analyze antennas.
v. apply electromagnetic phenomena to rf, microwave, optical, and wireless communication systems.
vi. apply electromagnetics principles to real-world problems.

EEE 355 Physical Electronics (2-1-0)= 3 Units
Course Content

Nature of atom. Basic concepts of semiconductors charge carriers, effective mass, mobility, conductivity life time. Free electron motion in static electric and magnetic fields, electronic structure of matter, conductivity in crystalline solids. Theory of energy bands in conductors, insulators and semi-conductors; energy band diagram; atomic bonding in semiconductors; electrons in metals and electron emissions; carriers and transport phenomena in semi-conductors; characteristics of some electronic devices – junction diodes, transistors, vacuum tubes, photoresistors, photocell and light emitting diode. Continuity equation, flow equations, Hall Effect; bipolar transistors - characteristics, CB, CC, CE configurations; switching devices. Fabrication techniques of elementary discrete devices and integrated circuit (IC) technology – BJT, MOSFETs, IGBT etc.

Course Learning Outcome

i. explain the nature of an atom and how it relates to the behaviour of electrons in semiconductors.
ii. define the basic concepts of semiconductors, such as charge carriers, effective mass, mobility, conductivity, and lifetime.
iii. calculate the free electron motion in static electric and magnetic fields, and understand how this relates to the conductivity of crystalline solids.

iv. explain the theory of energy bands in conductors, insulators, and semiconductors, and how this relates to the energy band diagram.
v. describe the atomic bonding in semiconductors, and how this affects the behaviour of electrons in metals and electron emissions.
vi. analyse the characteristics of some electronic devices, such as junction diodes, transistors, vacuum tubes, photo resistors, photocells, and light emitting diodes.

EEE 357 Electric Circuits (2-0-3)= 3 Units

Course Content

One-Port and Two-Port networks – introduction to devices and components, lumped circuit abstraction. Linear Circuits – energy storage elements, transient response of first and second-order systems, frequency domain analysis, operational amplifiers and applications. AC circuit analysis techniques, power factor, sinusoidal steady-state response, phasor analysis of AC circuits. Laplace transforms and applications to circuit analysis. Electromechanical circuits – resonance, energy transfer, Q-factor, oscillators and resonators. Active and Passive Filters – design, frequency response of low-pass, band-pass, and high-pass filters. Sallen-Key filter design. Nonlinear circuit applications – analysis of circuits with non-linear resistors, diodes, MOSFETs. Laboratory-based Project.

Course Learning Outcome

i. analyze linear circuits in the time and frequency domains.
ii. use laplace transforms to solve circuit problems.
iii. design and analyze active and passive filters.
iv. analyze electromechanical circuits.
v. analyze circuits with nonlinear resistors, diodes, and mosfets.
vi. solve circuit problems using matlab or other circuit simulation software.

EEE 359 Analog Circuits & Devices (2-0-3) = 3 Units

Course Content

The BJT transistor, its characteristics (AC-DC load lines), small signal amplifier, single-stage transistor amplifiers using BJTS and FETs, equivalent circuit and calculation of current gain, voltage gain, power gain, input and output impedance, CB, CC, CE configurations, multi-stage amplifier using BJTs and FETs, small-signal analysis and large-signal analysis. Semiconductor devices – models, characteristics and applications, small signal amplifiers. Audio amplifiers, class A, AB, B, C, and push-pull design. Operational Amplifiers: Parameters and applications, feedback, oscillators, power amplifiers, high-frequency amplifier, tuned amplifier, broadband and narrow-band amplifiers,

power amplifiers, differential amplifiers, voltage and current stabilizing circuit, voltage amplifiers. Laboratory-based project to include applications in communication systems.

Course Learning Outcome

i. describe the characteristics of a bjt transistor, including its ac-dc load lines
ii. design and analyse single-stage transistor amplifiers using bjts and fets
iii. calculate the current gain, voltage gain, power gain, input and output impedance, and other parameters of transistor amplifiers.
iv. understand the different configurations of transistor amplifiers, including cb, cc, and ce.
v. design and analyse multi-stage transistor amplifiers.
vi. perform small-signal and large-signal analysis of transistor amplifiers.

EEE 453 Control Systems I (2-0-0)= 2 Units

Course Content

Nature and use of automatic control; concept and purpose of feedback; servomechanism control and regulatory control. Description of simple control systems – servomotors, tachogenerators, error detectors, amplifiers, actuators, valves. Open-loop and closed-loop control system, system specifications. Mathematical models – differential equations, state-space models and transfer

function model. Transfer function model of simple electrical, mechanical, pneumatic, hydraulics, and thermal systems. Block diagram algebra – reduction techniques and signal flow graphs. Simulation of dynamics systems. Controllability. Observability. System types. Effects of feedback. Sensitivity. Time response analysis: transient response to test input signals, steady-state errors, stability analysis, Routh-Hurwitz criterion, root-locus techniques, time-domain performance criteria. Frequency-response analysis: Bode plots, Nyquist plots, bandwidth, resonant peak, gain and phase margins, non-minimum phase systems, inverse responses, Nyquist criterion, Hall charts and Nichols chart, frequency-domain performance criteria. Classical vs modern control design techniques, bang-bang control, pole placement, PID control, IMC control, ratio control, cascade control, introduction to non-linear systems. Detailed use of MATLAB-SIMULINK for analysis and design.

Course Learning Outcome

i. describe the basic concepts of automatic control. this includes the difference between open-loop and closed-loop control systems, the purpose of feedback, and the different types of control systems.
ii. develop mathematical models of control systems. this includes using differential equations, state-space models, and transfer functions to model the behaviour of control systems.

iii. analyse the transient and steady-state responses of control systems. this includes using time-domain and frequency-domain techniques to analyse the response of control systems to different input signals.

iv. design control systems using classical and modern control techniques. this includes designing bang-bang control, pole placement, pid control, imc control, ratio control, and cascade control systems.

v. use matlab-simulink to simulate and analyse control systems. this includes using matlab-simulink to create models of control systems, simulate the response of control systems to different input signals, and analyse the performance of control systems.

vi. apply the principles of automatic control to real-world systems. this includes being able to identify control systems in real-world applications and apply the principles of automatic control to improve the performance of these systems.

EEE 457 Communication Principles (2-1-0) = 3 Units

Course Content

Amplitude modulation; double sideband, single sideband and vestigial sideband modulation schemes; simple modulators, power and bandwidth performance. Angle modulation (frequency modulation, phase modulation), bandwidth requirements. Transmitter circuits. Receiver circuits.

Clippers. Limiters. Amplitude modulated signal reception; discrimination, frequency tracking loop, phase locked loop and noise performance. Commercial radio systems. Transmission media; attenuation in open space, air, cable and fibre channels; fibre optics; construction of cables and fibres, sampling theorem, pulse amplitude modulation, pulse width modulation, multiplexing, quantization systems, pulse-code and delta modulation, courses and correction of errors in PCM and DM.

Course Learning Outcome

i. explain the different types of modulation schemes and their applications.
ii. calculate the power and bandwidth requirements of different modulation schemes.
iii. design simple modulators and receivers.
iv. understand the principles of clippers and limiters.
v. analyse the performance of amplitude modulated signals in the presence of noise.
vi. describe the different types of transmission media and their characteristics.

EEE 551 Digital Signal Processing (2-1-0) = 3 Units

Course Content

Introduction: Advantages of digital over analogue signal processing, problems of digitization, overview of application of DSP, basic elements of DSP system. Discrete-time signals & systems:

discrete-time sequences (signals), classification and determination of discrete-time system, difference equations and solutions, convolution, correlation, impulse response. Digital processing of analogue signals: sampling of analogue signals, sampling theorem, aliasing, quantization, noise, and coding, types and selection of ADC/DAC, Sigma-delta ADC. Analytical tools: z-transform, properties, transfer function, inverse z-transform, z-plane poles and zeros, analysis of linear time-invariant in z-domain, system stability. Discrete Fourier Analysis: Discrete Fourier Transform (DFT) and 22 properties, inverse DFT, truncated Fourier transform, windowing, FFT algorithms. Digital Filters: Definition and types, structure and design. FIR filters: Transfer function, characteristics, applications, design methods, Gibb's effect and elimination, FIR filter realization. IIR filter: Transfer function, characteristics, applications, overview of analogue filter design techniques, design methods-conversion from analogue to digital filter design techniques, IIR filter realization. Structure of Discrete Time System: Block diagram representation of constant coefficient difference equations, IIR and FIR systems and their basic structures, stability of discrete time systems. Software implementation of DSP algorithms including signal compression and spectral analysis. DSP Microprocessors: Architecture, fixed point versus floating point DSP, Finite word length effects. DSP chips: interfacing and programming. Practical application of DSP in audio and video applications.

Course Learning Outcome

i. understand the advantages and disadvantages of digital signal processing (DSP) over analogue signal processing.
ii. apply the sampling theorem to convert analogue signals to digital signals.
iii. quantize and encode digital signals to reduce noise and improve accuracy.
iv. use z-transforms to analyse the properties of linear time-invariant systems.
v. design and implement FIR and IIR filters.
vi. apply DSP algorithms to signal compression and spectral analysis.

EEE 571 Introduction to Mechatronics Design

(2-0-0)= 2 Units

Course Content

Basic instrumentation concepts; Overview of mechatronics and its design approach; Measurement Systems; Control Systems. Microprocessor-based controllers: introduction, hardware overview, programming, interrupts, on-chip subsystems, parallel I/O. Choice of embedded computers (HCS12 and PIC); choice of level of languages: low-level, mid-level, high-level languages. Analog and digital devices: Op-amp, ADC, DAC, and power transistors, H-bridge, relay-bridge. Programming of microprocessors, mechanics prototyping, and the design process. Application of analog and digital electronics to modern mechatronics systems and intelligent manufacturing particularly smart sensors,

controllers and actuators. Stepper motor controller and driver. Serial communication, analog I/O, PWM, interfacing communication with PC. Modelling and control of electromechanical systems: actuators (solenoids, solid-state witches, DC motors, stepper motors, servomotors, AC motors), sensors (position, velocity, force, tactile, pressure, level, and ultrasonic), and their applications to intelligent manufacturing. Analog and Digital Sensors. Encoders. Electric motors, actuators, and sensor integration, motion control, and mechanical drives. Pneumatic and Hydraulic Systems: directional control valves, rotary actuators. Mechanical Actuation Systems: cams, gear trains, ratchet and pawl, belt and chain drives, bearings. Introduction to CNC Programming. Introduction to Programmable Logic Controller (PLCs). Introduction to design of robotic systems.

Course Learning Outcome

i. understand the basics of instrumentation and measurement
ii. design and implement control systems using microprocessors.

iii. quantize and encode digital signals to reduce noise and improve accuracy.
iv. apply analogue and digital electronics to mechatronics systems
v. model and control electromechanical systems.
vi. apply DSP algorithms to signal compression and spectral analysis.

CORE COURSES

CPE 252 Introduction to Digital Systems (2-0-3) = 3 Units

Course Content

Number system (Binary, Octal, Grey, Excess-3, Hexadecimal number systems). Binary arithmetic; Addition, subtraction, multiplication, division Logic components, Boolean algebra, DeMorgan Theorems. Combinational logic analysis and synthesis. Introduction to Sequential Circuits.

Synchronous and synchronous sequential logic analysis and design, digital subsystems, computer organization and design to include finite state machines, data path design, control path design, Static Random Access Memory (SRAM) operation and Single Cycle Central Processing Unit (CPU) design, Computer-Aided Design (CAD) tools and Field Programmable Grid Arrays (FPGA) to implement digital circuits. Laboratory sessions on Digital systems design using Logic Tutors. Simple circuit designs such as Switches, Lights, Multiplexers, Latches, Flip-flops, Registers, Counters and Timers. Design and implementation of Adders, Subtractors, and Multipliers, Finite State Machines, and Memory Blocks.

Course Learning Outcome

i. understand the fundamentals of digital systems and also gain knowledge of digital system components.
ii. apply combinational and sequential logic to develop digital systems.
iii. understand the concept of timing, clocking and also learn about system simulation and verification.
iv. troubleshoot and debug digital system.
v. explore digital system applications and develop critical thinking and problem-solving skills.
vi. foster teamwork and collaboration.

CPE 351 Digital Systems Design with VHDL

(2-0-0)= 2 Units

Course Content

Finite State Machine: definition, mealy and moore models, state diagram, state table, transition table. Sequential circuits design using flip-flops, asynchronous, and synchronous circuit design. Algorithm State Machine. Design examples and exercises. Structured Design; Computer aided electronic system design tools, Schematic circuit capture, Hardware description languages, Design process (simulation, synthesis), Structural design decomposition. Introduction to VHDL: VHDL language abstractions, Design hierarchies, VHDL component, Lexical description, VHDL source file, Data

types, Data objects, Language statements, Concurrent VHDL, Sequential VHDL, Advanced features of VHDL (library, package and subprograms). Structural level modeling, Register-Transfer level modeling, FSM with data path level modeling, Algorithmic level modeling. Introduction of ASIC, Types of ASIC, ASIC design process, Standard cell ASIC synthesis, FPGA Design Paradigm, FPGA synthesis, FPGA/CPLD Architectures. VHDL Designs.

Course Learning Outcome

i. define a finite state machine and its different types (mealy and moore)
ii. create state diagrams, state tables, and transition tables to represent finite state machines.
iii. design sequential circuits using flip-flops, both asynchronously and synchronously.
iv. implement algorithm state machines using hardware description languages (hdls).
v. use computer-aided design (cad) tools to simulate and synthesize hdl designs.
vi. understand the different levels of modeling for digital systems, including structural, register-transfer, finite state machine, and algorithmic.

CPE 352 Computer Architecture and Organization

(2-1-0)= 3 Units

Course Content

Computer Fundamentals: Development history of computer hardware and software. Hardwired vs. Stored Program Concept. Von-Neumann Architecture. Harvard Architecture: principle of operation, advantages, disadvantages. Single Address Machine. Contemporary Computers. Computer system: block diagram, functions, examples, dataflow, control line. Introduction to CISC and RISC architecture: principle of operation, merits, demerits. Storage and Input/Output Systems: computer function (fetch and execute cycles), interrupts, interconnection structures (bus structure and bus types), overview of memory system, memory chip organization and error correction, cache memory, memory storage devices. Overview of I/O, programmed and interrupt-driven I/Os, DMA, I/O channel and I/O processor. Control unit: micro-operations, control of the CPU, hardwired implementation, control unit operation, micro-instruction sequencing and execution, micro-programmed control.

Course Learning Outcome

i. explain the basic concepts of computer hardware and software, including the history of computing, the different types of computer architectures, and the functions of the major components of a computer system.
ii. distinguish between hardwired and stored program concepts, and explain the advantages and disadvantages of each.

iii. describe the von-neumann architecture and the harvard architecture, and explain the differences between the two.
iv. identify the components of a single address machine, and explain how they work together.
v. describe the different types of contemporary computers, and explain their strengths and weaknesses.
vi. understand the basic principles of storage and input/output systems, including the fetch and execute cycle, interrupts, bus structures, memory organization, error correction, cache memory, and memory storage devices.

CPE 353 Low Level Language Programming

(2-0-3)= 3 Units

Course Content

Introduction: language level of abstraction and effect on machine, characteristics of machine code, advantages, justification of machine code programming, instruction set and dependency on underlying processor. Intel 8086 microprocessor assembly language programming: Programming model as resources available to programmer, addressing modes, instruction format, instruction set-arithmetic, logical, string, branching, program control, machine control, input/output etc; assembly directives, hand-assembling, additional 80x86/Pentium instructions. Modular programming.

Interrupt and service routine. Interfacing of assembly language to C. Intel 80x87 floating point programming. Introduction to MMX and SSE programming. Motorola 680x0 assembly language programming. Extensive practical engineering problems solving in assembly language using MASM for Intel, and cross-assembler for Motorola.

Course Learning Outcome

i. write assembly language programs for the intel 8086 microprocessor
ii. use addressing modes to access memory locations.
iii. assemble and disassemble assembly language programs.
iv. write modular assembly language programs.
v. handle interrupts and service routines.
vi. interface assembly language programs to c programs.

CPE 354 Computer Engineering Laboratory

(0-0-6)= 2 Units

Course Content

Laboratory works on basic aspects of Computer Engineering, in particular, computer architecture and organization.

Course Learning Outcome

i. understand the basic concepts of computer architecture and organization
ii. design and implement simple computer systems..
iii. analyse the performance of computer systems.
iv. debug computer systems..
v. work with computer hardware.
vi. apply the knowledge of computer architecture and organization to real-world problems.

CPE 355 Digital System Design Laboratory

(0-0-6) = 2 Units

Course Content

Designing, building and debugging of various circuits and system using VHDL programming environment.

Course Learning Outcome

i. write VHDL code to describe the behavior of digital circuits.
ii. use a VHDL simulator to test and debug their designs.

iii. translate VHDL code to hardware description language (HDL) files that can be synthesized into an FPGA or other programmable
iv. use a variety of tools to design and implement digital systems.
v. understand the principles of digital design and verification.
vi. apply their knowledge of VHDL to solve real-world problems

CPE 356 Information System Analysis and Design

(2-0-0) = 2 Units

Course Content

Software Design Concepts and principles, design of software quality, abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, Design methodology, data, architectural, transformation mapping. Post-processing design; optimization; interface design, Foundations of human-computer interaction: Human-centered development and evaluation, Procedural design: structure programming, graphical notation, tabular notation. Program Design Language (PDL), A PDL example, Object-oriented design: Concept of patterns and the use of APIs; modeling tools such as class diagrams, CRC cards, and UML use cases, Software: re-use and re-engineering, Client/server Software Development and Computer Aided Software Development.

Course Learning Outcome

i. understand the basic concepts of software design, such as abstraction, refinement, and modularity.
ii. apply these concepts to design software that is efficient, reliable, and maintainable.
iii. design software that is flexible and adaptable to change.
iv. use different design methodologies, such as data-driven, architectural, and transformation mapping.
v. design user interfaces that are user-friendly and effective.
vi. apply object-oriented design principles to create reusable and extensible software.

CPE 358 Operating Systems Principles (2-1-0) = 3 Units

Course Content

Overview of Operating System Architecture: interfaces, flow of control. Processor Management: concurrent processes, process synchronization and communication, deadlock. Threads. Messages. Memory Management: storage hierarchies, allocation strategies, replacement algorithms. Device Management: design objectives, device drivers, interrupts, input/output devices. File Management: file system structure, file maintenance, storage allocation. A simple program to implement a device

driver, etc. Principles of distributed systems, distributed operating systems, processes and threads, concurrent programming, distributed inter-process communication, distributed process scheduling, virtualization, distributed file systems, security in distributed systems, distributed middleware and applications such as the web and peer-to-peer systems.

Course Learning Outcome

i. explain the basic concepts of operating systems, such as processes, threads, memory management, and file systems.
ii. analyze and design operating system algorithms, such as scheduling algorithms and deadlock prevention algorithms.
iii. implement operating system components, such as device drivers and file system managers.
iv. understand the principles of distributed systems, such as distributed file systems and distributed process scheduling.
v. apply operating system concepts to solve real-world problems.
vi. evaluate the performance of operating systems and identify potential bottlenecks.

CPE 360 Object-Oriented Programming (2-0-3) = 3 Units
Course Content

Basic Object-Oriented Programming (OOP) concepts: Classes, Objects, inheritance, polymorphism, Data Abstraction, tools for developing and design principles. Data types and operators associated with an OOP. Java syntax and data objects. Compiling, interpreting and debugging Java programs, Central flow constructs, objects and classes programming, Arrays, methods. Exceptions, Applets and Abstract, OLE, Persistence, development of Graphical User Interface (GUI) programs, using Abstract Window Toolkit (AWT). Thread concept: Thread methods, thread states, thread priorities and thread scheduling, thread synchronization, daemon threads, runnable interface, thread groups. Multimedia Applications: Loading, Displaying and Scaling Images, Introduction to Animation, Graphics Double Buffering, Media Tracker, Loading and Playing audio Clips, Customizing Applets, Image Maps. Network programming: Introduction, Manipulating URLs, Establishing a Simple Server, Establishing a Simple Client, Client/Server Interactions, Security and the Network. Basic engineering circuits' design using OOP.

Course Learning Outcome

i. define and explain the basic concepts of OOP, such as classes, objects, inheritance, polymorphism, and data abstraction.
ii. apply OOP concepts to the development of Java programs.
iii. use the Java syntax and data objects to create and manipulate objects.

iv. write and debug Java programs that use central flow constructs, objects and classes programming, arrays, and methods.
v. handle exceptions and create applets.
vi. develop GUI programs using the Abstract Window Toolkit (AWT).

CPE451 Data Communication and Networks

(2-0-3) = 3 Units

Course Content

Local Area Networks: medium access control techniques – Ethernet, token bus and token ring: LAN standard; fibre distributed data interface, Metropolitan Area Network. Peer-to-peer, client Server. Client-Server Requirements: Information Network Software: Features and benefits of major recovery mechanism. Information Network Software: Features and benefits of major Network Operating Systems. TCP/IP and Network OS. Internetworking: definition, architecture, services, Internet addressing. Internet protocol, IPv4, IPv6. Internet programming, Intranet. System administration, and security issues.

Course Learning Outcome

i. describe the different types of LANs and their respective media access control techniques.

ii. explain the differences between peer-to-peer and client-server networks.
iii. identify the features and benefits of major network operating systems.
iv. understand the TCP/IP protocol suite and its role in internetworking.
v. program for the internet using the appropriate protocols.
vi. administer and secure a network.

CPE453 Microprocessor Technology and Interfacing

(2-1-0)= 3 Units

Course Content

A basic microprocessor system: the CPU, memory, I/O, and buses subsystem, basic operation of a microprocessor subsystem: fetch and execute cycle, the architecture of some typical 8-bit, 16-bit microprocessors (INTEL, MOTOROLA) and their features. Programming model in real mode: registers, memory, addressing modes. Organization of the interrupt system, interrupt vectors, and external interrupts, implementation of single and multiple interrupts in real mode. Memory interfacing and address decoding. I/O interfacing: memory mapped i/o, isolated i/o, bus timing, i/o instructions. Peripheral devices interfacing: 8255 PPI/6821 PIA, 8251, USART/6821, UART, DMA, Timer/Counter chips etc. instruction set. Assembly Language Programming of INTEL and ARM microprocessor. Discussion of typical system e.g., IBM PC, Apple Macbook.

Course Learning Outcome

i. describe the basic components of a microprocessor system and explain the fetch and execute cycle.
ii. identify the features of some typical 8-bit and 16-bit microprocessors.
iii. understand the principles of computer architecture and organization.
iv. apply these principles to the design and implementation of microprocessor-based systems.
v. use assembly language to program microprocessors.
vi. debug and troubleshoot microprocessor-based systems.

CPE455 Microprocessor Design Laboratory

(0-0-6)= 2 Units

Course Content

Designing, building and debugging of small general-purpose computer with a microprocessor and specific-purpose computer with a microprocessor.

Course Learning Outcome

i. design a small general-purpose computer with a microprocessor.

ii. build a small general-purpose computer with a microprocessor.
iii. design a specific-purpose computer with a microprocessor
iv. build a specific-purpose computer with a microprocessor.
v. debug a computer system with a microprocessor.
vi. document the design and construction of a computer system.

CPE 457 Introduction to Artificial Intelligence

(2-1-0) = 3 Units

Course Content

Introduction to AI. Brief history. Different agent architectures. Search: uninformed and heuristic search, A*, local search and optimization. Constraint satisfaction problems. Game playing and adversarial search. Knowledge Representation. Logical reasoning. Propositional logic. Planning algorithms. Reasoning under uncertainty. Bayes rule. Belief networks. Decision making. Utility theory. Reinforcement learning. Game theory applications.

Course Learning Outcome

i. explain the basic concepts of artificial intelligence, such as agents, search, knowledge representation, and reasoning.

ii. implement different search algorithms, such as uninformed search, heuristic search, and A*.
iii. solve constraint satisfaction problems.
iv. play games against other agents using adversarial search.
v. represent knowledge in logical form and use propositional logic to reason about it.
vi. reason under uncertainty using Bayes rule and belief networks.

CPE 459 Data Structure and Analysis of Algorithms

(2-0-0) = 2 Units

Course Content

Basic structures for data representation -Data definition languages, Sequential and linked storage allocation, for linear lists, for multi-linked structures, for string processing techniques, Trees – implementation, traversal, mathematical properties, balanced, trees, heaps, hash tables, Efficient algorithms for sorting, searching, and selection. Algorithm analysis: worst and average, case analysis. Recurrences and asymptotic, Algorithm design techniques: divide-and-conquer, dynamic programming, greedy algorithms, amortized analysis, Primitive types, Arrays, Records, Strings and string processing, Data representation in memory, Static, stack, and heap allocation, Runtime storage management, Pointers and references, Linked structures, Implementation strategies for stacks, queues, and hash tables, Algorithms for fundamental graph problems such as depth-first search,

connected components, topological sort, and shortest paths. Possible additional topics: network flow, string searching, parallel computation; and C/C++ Programme to implement basic data structure and their manipulation.

Course Learning Outcome

i. understand the basic data structures and algorithms used in computer science. This includes data structures such as linked lists, trees, and hash tables, as well as algorithms such as sorting, searching, and selection.
ii. analyze the efficiency of algorithms. This includes being able to determine the worst-case, average-case, and best-case time and space complexity of algorithms.
iii. design algorithms. This includes being able to use divide-and-conquer, dynamic programming, greedy algorithms, and other techniques to design efficient algorithms.
iv. implement algorithms in C/C++. This includes being able to use the data structures and algorithms learned in the course to write efficient C/C++ code.
v. apply data structures and algorithms to real-world problems. This includes being able to use the knowledge learned in the course to solve problems in areas such as networking, data mining, and artificial intelligence.

vi. communicate effectively about data structures and algorithms. This includes being able to explain the concepts learned in the course to others, both verbally and in writing.

CPE 200 Student Work Experience Programme (SWEP) 3 Units

Course Content

A 2-months student work experience within the university.

Course Learning Outcome

i. acquire industrial workplace perceptions, ethics, health and safety consciousness, inter-personal skills and technical capabilities needed to give them a sound engineering foundation.
ii. learn and practise basic engineering techniques and processes applicable to their specialisations.
iii. build circuit, devices, structures or facilities relevant to their specific engineering programmes and applications.
iv. acquire competence in technical documentation (log-book) and presentation (report) of their practical experiences.

CPE 300 Student Industrial Work Experience I (SIWES I) 3 Units

Course Content

A 3-months student work experience outside the university.

Course Learning Outcome

i. demonstrate proficiency in at least any three softwares in their chosen career choices.
ii. demonstrate proficiency in some animation videos (some of which are free on YouTube) in their chosen careers.
iii. carry out outdoor hands-on construction activities to sharpen their skills in their chosen careers.
iv. demonstrate proficiency in generating data from simulations analysis
v. demonstrate proficiency in how to write engineering reports from lab work.
vi. fill logbooks of all experience gained in their chosen careers.
vii. write a general report at the end of the training.

CPE 400 Student Industrial Work Experience II (SIWES II)

9 Units

Course Content

A 6-months student work experience outside the university.

Course Learning Outcome

i. be exposed and prepared for the Industrial work situation they are likely to meet after graduation, by developing their occupational competencies.
ii. bridge the existing gap between theory and practice of programmes through exposure to real-life situations, including machines and equipment handling, professional work methods and ethics, human relations, key performance assessment methods, and ways of safeguarding the work environment – human and materials.
iii. experience/simulate the transition phase of students from school to the world of work and the environment seamlessly, and expose them to contacts for eventual job placements after graduation
iv. be motivated to identify the industrial and practice engineering challenges of their place of engagement and the larger society and creatively device impactful solutions to them.
v. exploit the opportunity to improve and utilise their acquired critical thinking and innate creativity skills, during the program and SIWES Seminar presentation respectively.

CPE 551 Individual Project I with Seminar Presentation

(0-0-9)= 3 Units

Course Content

This course lasts for one academic session but broken into two independent components for effective monitoring and evaluation. This semester focuses on project idea conceptualization and approval of topics by Supervisors. A detailed review of Literature and presentation of proposed research methodology. Each student must submit a progress report at the end of the first semester. The highlights of the report include: Project Topic, Project background, Aim and Objective, Scope and limitation, Literature review and proposed methodology. A project status report is to be presented at the end of the first semester. Each student must attend Engineering Seminars.

Course Learning Outcome

i. review literature and observe local environment
ii. identify gap from literature or problem that needs solution from local environment
iii. conceptualise a project topic to capture the gap identified
iv. outline Aim and Objectives needed to fill the gap or solve the problem
v. outline workable methodology based on knowledge gathered so far from courses taken and literature

CPE 552 Individual Project II with Seminar Presentation

(0-0-9)= 3 Units

Course Content

Continuation of Final year individual project. The emphasis of this semester is on project design and implementation. Prototype development and evaluation. Corrections are made to topics and other issues raised at the end of CPE501. A detailed design concept and full design implementation are expected at the end of this semester. Each student must submit a full report on the project. Final implementation seminar is presented at the end of the semester. Each student must attend Engineering Seminars.

Course Learning Outcome

i. perform each of the outlined methods to achieve the stated objectives
ii. perform evaluation and testing of the solution derived
iii. document process and results gotten
iv. determine if project is environmental friendly

CPE 553 Embedded Systems Design (2-0-3) =3 Units

Course Content

The course content should focus on: Introduction to embedded and real time systems, embedded system architecture, embedded processor architectures, interrupts and exception processing, real time operating systems, real time scheduling, program design and analysis, processes and operating systems, embedded microprocessors, system design techniques. Practical implementation of embedded system.

Course Learning Outcome

i. understand the basics of embedded and real-time systems.
ii. design and implement embedded system architectures.
iii. understand embedded processor architectures.
iv. use interrupts and exception processing in embedded systems.
v. implement real-time operating systems in embedded systems.

CPE554 Robotics and Automation (2-0-3) = 3 Units

Course Content

Robotic classification and manipulation. Technology and history of development of robots. Applications. Direct and inverse kinematics: arm equation. Workspace analysis and trajectory planning. Differential motion and static. Manipulator dynamics. End-of-arm tooling. Automation

sensors. Robot vision. Work-cell support systems. Robot and system integration. Safety. Human interface. Robot control system. Circuit and system configuration. Task-oriented control. Robot control programming. Fuzzy logic based robot control. Fundamentals of automation. Strategies and economic consideration. Integration of systems. Impact to the production factory. Evaluation of conventional processes. Analysis of automated flow lines. Assembly systems and line balancing. Automated assembly systems. Numerical control and adaptive control. Robot applications. Automated materials handling and storage systems. Automation in inspection and testing. Linear feedback control systems. Optimal control. Computer process control. Computer integrated manufacturing systems. Future automated factory.

Course Learning Outcome

i. understand the basics of robotics and automation.
ii. classify robots and manipulators.
iii. analyses the kinematics and dynamics of robots.
iv. design and use end-of-arm tooling.
v. use automation sensors, including robot vision.
vi. integrate robots into work cells and systems.

CPE 555 Industrial Application Studies and Innovations

(2-0-3) = 3 Units

Course Content

Enterprise project design. Evaluation of different industry applications and innovation processes. Application Conceptualization. Roles of Software Incubation Centre's. Study of a select group of industrial applications.

Course Learning Outcome

i. understand the basics of enterprise project design
ii. evaluate different industry applications and innovation processes.
iii. conceptualize applications for different industries
iv. understand the roles of software incubation centres.
v. identify opportunities for innovation in existing applications.
vi. design new applications that meet the needs of specific industries.

CPE 556 Modeling and Simulation (1-0-3) = 2 Units

Course Content

Introduction to basic concepts of probability. Model specification - classification and design decisions, modeling frameworks (Petri nets, timed automata, Markov chains, stochastic Petri nets) and parameter selection.

Simulation - discrete-event simulation, generation of random numbers, transformation of random numbers, and parameter fitting. Output analysis - central limit theorem, confidence interval construction, steady-state detection. Design a representative model, implement the model, complete verification and validation process of the model, report on the model in oral and written form, and change the model to reflect corrections, improvements and enhancements. Use MATLAB to explore a range of programming and modeling concepts.

Course Learning Outcome

i. understand the basics of probability and statistics.
ii. specify and design discrete-event simulation models and generate random numbers and simulate events.
iii. analyse the output of simulation models and verify and validate simulation models.
iv. report on the results of simulation studies.
v. use MATLAB to program and simulate discrete-event systems
vi. use simulation to improve the design and performance of real-world systems.

CPE 557 Artificial Neural Networks and Programming

(2-0-0)= 2 Units

Course Content

Neural Network: Definition of artificial neural network. Similarities of neural network with human brain. Classification of ANN. Terminologies: input/output sets, weights, bias or threshold, supervised learning, network training, Convergence process, single layer vs. multilayer perception, Forward and Backward propagation, gradient descent rule. Back-propagation neural network, Variable term used in backpropagation neural network: learning rate, momentum, hidden nodes, sigmoid activation function. Backpropagation algorithm of ANN. Design of ANN model, training sets for ANN, test sets for ANN, network testing and performance. Engineering applications. ANN programming.

Course Learning Outcome

i. define artificial neural networks and explain their similarities to the human brain.
ii. classify different types of artificial neural networks.
iii. understand the terminology used in artificial neural networks, such as input/output sets, weights, bias, supervised learning, and network training.

iv. explain the forward and backward propagation processes in artificial neural networks.
v. apply the gradient descent rule to train artificial neural networks.
vi. design, train, and test artificial neural networks for specific applications.

CPE 558 Digital Image Processing (2-1-0)= 2 Units

Course Content

Introduction: definition, problems, and applications of digital image processing. Discrete signals and Z-transform, digital Fourier Transform, Fast Fourier Transform. The approximation problem in network theory. Synthesis of low-pass filters. Spectral transforms and their application in the synthesis of high-pass and band-pass filters. Digital filtering, digital image acquisition devices. Digital image formats. Edge detection techniques, segmentation methods. Image Morphology. Image Enhancement. Image restoration techniques. Morphology. Fourier transform and Wavelet transform in image processing. Image registration techniques. Shape analysis. Image understanding. Artificial neural network and image understanding. Colour representation standards, equations, processing, quantization, and dithering. Case study: practical application of image processing to face recognition, fingerprint, iris, etc. Introduction to image compression techniques.

Course Learning Outcome

i. understand the basics of digital image processing.
ii. apply digital filters to images and Detect edges in images
iii. segment images into different regions
iv. enhance and restore images
v. apply morphology to images
vi. understand the applications of image processing in different domains

CPE560 Mobile and Cloud Computing (2-0-0) =2 Units

Course Content

Introduction to Mobile computing, Android mobile platform and devices, Other mobile platforms – Apple iOS, Microsoft Mango, Mobile data management, Mobile services. Mobile Cloud Computing- Introduction to mobile cloud, accessing cloud services with mobile devices, extending mobile app with cloud processing and resources, extending cloud services with the collective power of mobile devices, partitioning of service functions between mobile devices and clouds, Data management for mobile cloud, and Developing mobile cloud services and Android Mobile Communication. Social Issues. M-Commerce and Mobile Payment systems, Mobile Privacy issues and Ethics.

Course Learning Outcome

i. understand the basics of mobile and cloud computing
ii. describe the different mobile platforms, such as Android, iOS, and Windows Phone
iii. understand mobile cloud computing.
iv. access cloud services with mobile devices
v. extend mobile apps with cloud processing and resources
vi. develop mobile cloud services

CPE 561 Wireless Networks (2-0-0) = 2 Units

Course Content

Common terminologies, History of wireless communication, Wired vs. wireless networks, Types of wireless networks: Based on the connection. Types of wireless networks: Based on the geographical area covered. WLAN, WWAN, WPAN, WMAN. Comparison between WLAN, WWAN, WPAN and WMAN. Advantages and Disadvantages of wireless networks. Limitations of wireless networks. Generations of wireless technology (2G, 2.5G 3G, 4G& 5G). Uses of wireless technology. Satellite. Cellular phone networks. M-Commerce.

Course Learning Outcome

i. understand the common terminologies used in wireless communication

ii. compare and contrast wired and wireless networks and Identify the different types of wireless networks.
iii. explain the advantages and disadvantages of wireless networks.
iv. discuss the limitations of wireless networks.
v. describe the different generations of wireless technology
vi. Student should be able to explain the uses of wireless technology.

CPE 562 Information Security Techniques (2-0-0) = 2 Units

Course Content

Introduction: Overview of computer security, attacks and services, control of hardware and software. Usage, Intruder, Viruses and Worms: Intrusion techniques. Non-technical attacks. Password protection and vulnerability. Intrusion detection. Nature of viruses. Malicious programs. Types of viruses. Antivirus approaches. Worm propagation and countermeasures: access control, intrusion detection and firewalls. Disaster Recovery: Documentation and backup system. Loss estimation. Developing a Secure Computer System: External Security Measures, Issue, Security Models. Firewalls (Gateways, Application, Cost and Effectiveness). Database Security: Security Requirements to Databases, Designing the Security, Methods of Protection, Security of Multilevel Database.

Course Learning Outcome

i. understand the basics of computer security, and Identify and describe different types of computer attacks.
ii. apply security controls to protect hardware and software
iii. to detect and respond to intrusions and Protect against viruses and worms
iv. implement disaster recovery plans
v. design secure computer systems
vi. secure databases

CPE 563 Computer Graphics and Animation

(2-0-0)= 2 Units

Course Content

Hierarchy of graphics software, using a graphics API, Simple colour models (RGB, HSB, CMYK), Homogeneous coordinates, affine transformations (scaling, rotation, translation), Viewing transformation, Clipping; and Programming examples in the creation and manipulation of graphics object. Animation (2D and 3D).

Course Learning Outcome

i. use a graphics API.
ii. implement simple color models
iii. use homogeneous coordinates and Apply affine transformations
iv. perform viewing transformations
v. implement clipping
vi. create and manipulate graphics objects.

CPE564 Hardware Systems Studies (2-0-0)= 2 Units Course Content

Introduction to reliability, maintainability, reliability specification and metrics. Application to computer hardware system, communication equipment, power systems, electronic components. Basic maintenance types, and procedures of computer and digital communication system. Fault troubleshooting techniques. QoS and time of availability of data communication. Quality control techniques. Design for higher reliability, fault tolerance.

Course Learning Outcome

i. apply RAM concepts to computer hardware systems, communication equipment, power systems, and electronic components.
ii. identify different types of maintenance and their procedures
iii. troubleshoot faults in computer and digital communication systems
iv. apply quality control techniques to improve the reliability of systems
v. design systems for higher reliability and fault tolerance
vi. communicate effectively about RAM concepts to technical and non-technical audiences

CPE565 Cryptography Principles and Applications

(2-0-0)= 2 Units

Course Content

History of cryptographic System, Public Key Systems, Digital Signatures. Information Theory: Entropy, Perfect Secrecy, Unicity Distance, Complexity Theory, NP-Completeness, Number Theory. Data Encryption Methods: Transposition Ciphers, Substitution Ciphers, Product Ciphers, Exponentiation Ciphers, Knapsack Ciphers, Breakable NP-Complete Knapsack, Encryption Standards DES, RSA, Elliptic Curves. Cryptographic Techniques: Block and Stream Ciphers, Autokey, Endpoints of Encryption, One-way Ciphers, Password and Authentication, Secret Keys and Public Keys, Threshold Scheme. Video scrambling techniques. Digital video encryption techniques:

principle, IRDETO, Viaccess, Videoguard, etc. Security and Legality Issues: Copyrights, Patents, Trade Secret, Ownership of Products, Computer Crimes, Ethical Issue in Computer Security.

Course Learning Outcome

i. understand the history of cryptography and the development of public key systems and digital signatures.
ii. Apply information theory concepts to cryptography, such as entropy, perfect secrecy, and unicity distance.
iii. design and analyze data encryption methods, such as transposition ciphers, substitution ciphers, product ciphers, exponentiation ciphers, and knapsack ciphers
iv. apply cryptographic techniques, such as block and stream ciphers, autokey, endpoints of encryption, one-way ciphers, password and authentication, secret keys and public keys, and threshold schemes.
v. understand video scrambling techniques, digital video encryption techniques, security and legality issues in cryptography, such as copyrights, patents, trade secrets, ownership of products, computer crimes, and ethical issues in computer security
vi. communicate effectively with both technical and non-technical audiences about cryptography

CPE 566 Intelligent Systems Design (2-0-0)= 2 Units

Course Content

System Modelling (Biological and Cognitive Paradigms, Dynamical Systems, Turing Machines and Concepts of Machine Intelligence, Intelligent Agents). Principles of Control (Open- and Closed-Loop Control, Optimality and Constraints, Stability and Performance). Principles of Measurement and Estimation (Sensors and Sensing, Probability and Error Models, Classifiers). Principles of Decision-Making (Crisp and Fuzzy Logic, Decision Trees, Case-based Reasoning, Bayesian Belief Networks, Path Planning). Numerical Methods (Evaluation and Search, Monte Carlo Simulation, Genetic Algorithms, Simulated Annealing, Particle Swarm Optimization).

Course Learning Outcome

i. understand the basics of system modelling, control, measurement, estimation, and decision-making
ii. use mathematical and computational tools to solve problems.
iii. design and implement intelligent systems
iv. analyse the performance of intelligent systems
v. stay up-to-date on the latest trends in artificial intelligence
vi. communicate effectively with both technical and non-technical audiences

CPE 568 Human Language Processing and Application

(2-0-0)= 2 Units

Course Content

Deterministic and stochastic grammars, Parsing algorithms, Corpus-based methods, Information retrieval, Language translation. Fundamentals of natural language modeling (using a local language; Yoruba, Hausa, Igbo, or any other African Language). Speech recognition; isolate, connected and continuous speech; definition, methods, problems, examples; speaker recognition. Speech synthesis; articulatory, format, concatenative, definition, methods, problems, examples. Speech understanding; definition, methods, problems, examples. Natural language-based interface to intelligent systems. Web-based speech interface design.

Course Learning Outcome

i. understand the basics of natural language processing
ii. construct and use deterministic and stochastic grammars.
iii. apply parsing algorithms to natural language text.
iv. perform information retrieval using natural language queries
v. translate text from one language to another

vi. develop natural language models for African languages
vii. build speech recognition, synthesis, and understanding systems

CPE 570 Project Management (2-0-0)= 2 Units

Course Content

Definition of computer project and project management, Components and features of a good computer-based project management technique. Computer network administration, Function of members and team management, team processes, team organization and decision-making, roles and responsibilities in a software team, role identification and assignment, team problem resolution, Project tracking, Software Project scheduling, Budgeting and Planning; Project organization, Software measurement and estimation techniques, Risk analysis, Software quality assurance, Software configuration management and Project management tools.

Course Learning Outcome

i. identify the components and features of a good computer-based project management technique.
ii. manage teams and their functions
iii. understand team processes, organization, and decision-making

iv. identify roles and responsibilities in a software team
v. resolve team problems
vi. track projects, schedule software projects, budget and plan projects, organize projects, measure and estimate software, analyse risks, assure software quality, manage software configuration, and use project management tools

CPE 572 Cyberpreneurship and Cyber law (2-0-0)= 2 Units

Course Content

Introduction: Definition of creativity, innovation, examples of creativity leading to innovation, commercialization of creative and innovative ideas. Trends in technology development. Entrepreneurship management and ownership. Establishing a new venture, risk management. Business Plan Development: definition, need, preparation of the business plan. Financing business. Sources of debt financing. Creating the marketing plan, pricing, creative advertising and promotion. Entrepreneurship case studies: Overview and analysis of successful entrepreneurs such as Bill Gates, Michael Dell, David Filo and Jerry Yang of Yahoo, etc. Nigerian Entrepreneurship: Discussion of the Nigerian business environment, and illustrated with successful Nigerian entrepreneurs.

Overview of the Nigerian Legal System: Civil and criminal. Basic concepts of law. Contract Law. . Current issues: digital signatures, Intellectual property and copyright. Speech Law: Defamation,

Sedition, Printing Press Act. Speech on the Internet. Advertising Code: Made in Nigeria rules and guidelines, Advertising Standards. Media and Licensing law in Nigeria: Developing an in-depth understanding of the nature and function of Nigerian media law. Public and Private licensing. Intellectual and moral rights. Music royalties, synchronization rights, performance rights. Role of music publishers. Broadcast rights, merchandising. Detailed analysis of Communications and Multimedia Act. Ethic and Etiquette: New codes of social behavior: the right to privacy.

Course Learning Outcome

LIST OF LABORATORISES AND WORKSHOPS

i. Digital System and Microprocessor Laboratory
ii. Software Engineering Laboratory
iii. Embedded Systems and Robotics Laboratory
iv. Prototyping and Integrated Systems Laboratory
v. Data Communication and Computer Network Laboratory
vi. Information and Network Security Laboratory

vii. Software Development Laboratory
viii. Communication systems and Applications Laboratory
ix. Power System and Machines Laboratory
x. Instrumentation And Control Laboratory
xi. Renewable Energy Laboratory
xii. Electronics and Communications Laboratory
xiii. Central Engineering Workshop
xiv. Material Science Laboratory
xv. Fundamentals of Fluid Mechanics Laboratory
xvi. Computer Software Lab
xvii. Computer Hardware and Networking Lab
xviii. Drawing Studio
xix. Central Engineering Workshop (Woodworks and fittings)
xx. Metallurgy/ Materials Testing & Strength of Materials Laboratory
xxi. Welding & Fabrication Workshop
xxii. Solid Mechanics Laboratory

SOME EQUIPMENT USED FOR TEACHING

The equipment below are at the Information Communication Unit of the University and are accessible for teaching

i. Sophos Firewall Server
ii. Dell R820 rack-mounted servers
iii. Dell R720 rack-mounted servers
iv. Cisco Routers
v. Cisco Switches
vi. Voice gateway server
vii. Juniper Switches
viii. Cisco wireless access points
ix. Corning Racks
x. Oracle blade server