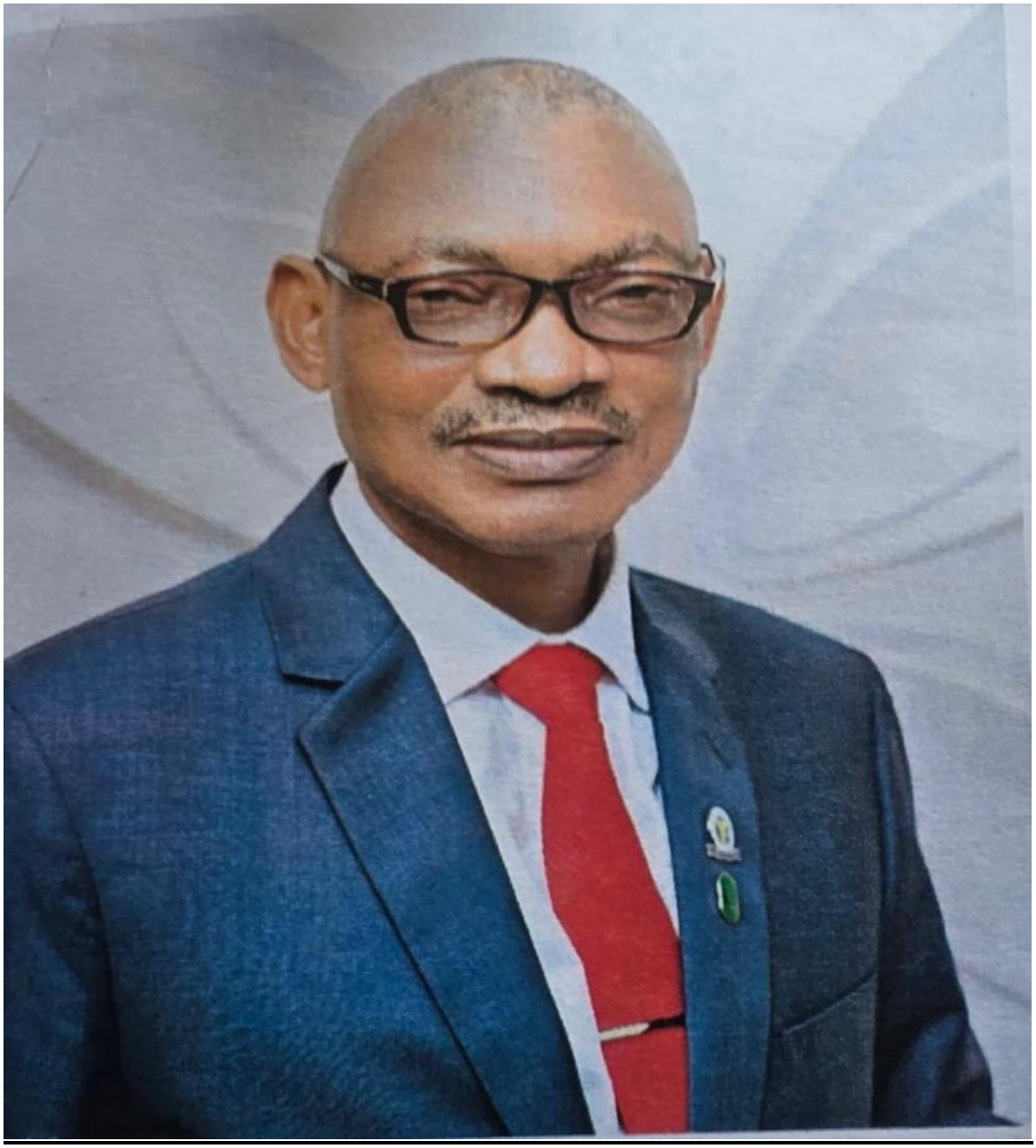
MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE

COLLEGE OF ENGINEERING AND ENGINEERING TECHNOLOGY

DEPARTMENT OF COMPUTER ENGINEERING

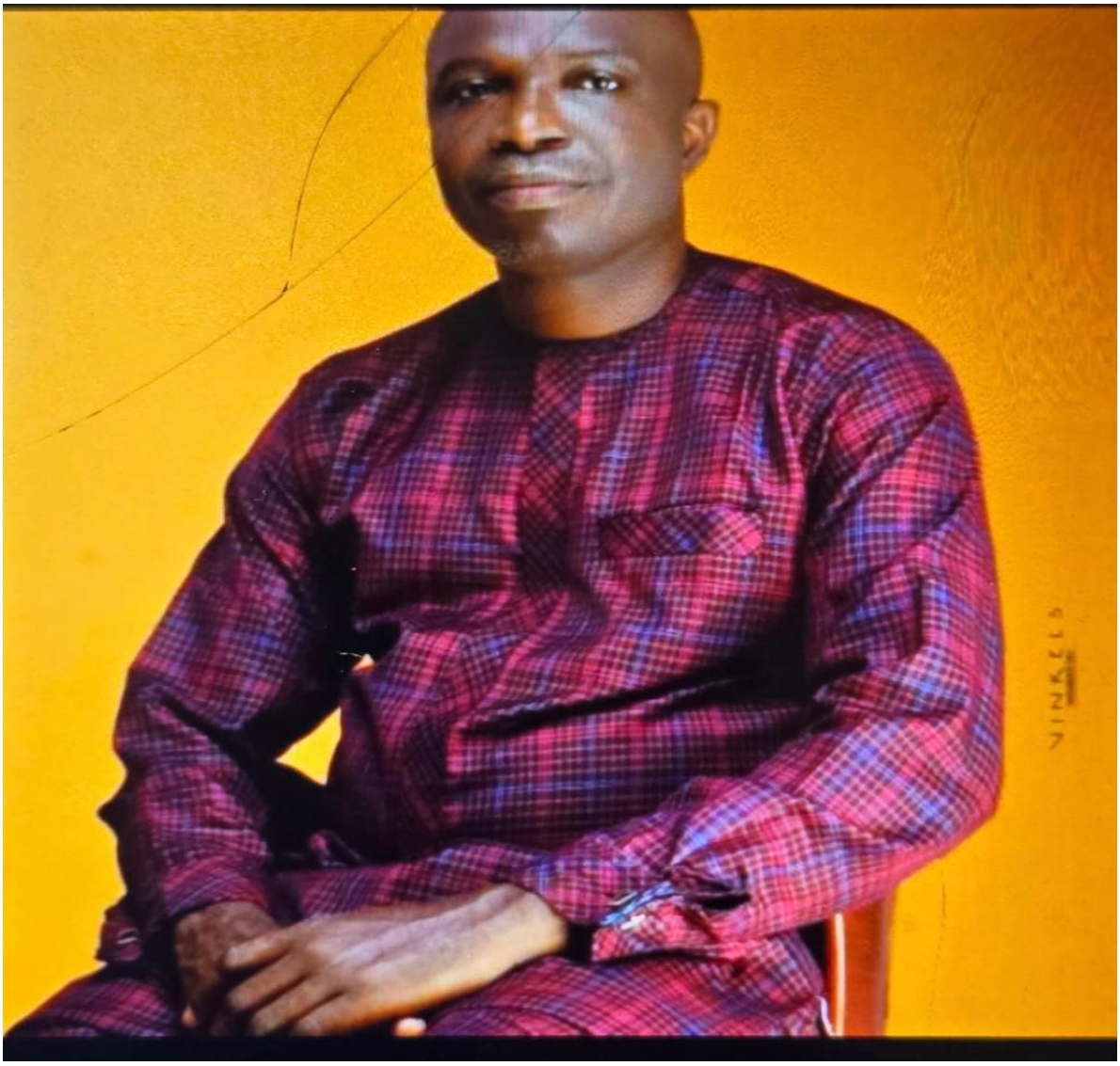
HAND BOOK



PROF MADUEBIBISI OFOR IWE

VICE CHANCELLOR

MICHEAL OKPARA UNIVERSITY OF



ENGR PROF B. N NWANKWOJIKE
DEAN OF COLLEGE
COLLEGE OF ENGINEERING AND ENGINEERING TECHNOLOGY

ENGR. DR NNOCHIRI I. U

HEAD OF DEPARTMENT

DEPARTMENT OF COMPUTER ENGINEERING

SECTION 1

INTRODUCTION

1.1 HISTORY OF THE PROGRAMME

Edict No. 48 of the Federal Government of Nigeria established the Michael Okpara University of Agriculture, Umudike in May 1993. In due course, it became clear that the mission of the Institution could not be properly achieved, neither could Agriculture be successfully developed nor meaningfully utilized in the industrialization, mechanization and sustenance of the nation without an accompanying College of Engineering. Thus in 2001/2002 academic session, the College of Engineering and Engineering Technology, came into existence with the establishment of the Department of Agricultural Engineering followed in quick succession by Departments of Electrical/Electronic Engineering, Civil Engineering and Mechanical Engineering in the 2003/2004 academic session. Computer Engineering took off in the 2004/2005 academic session and Chemical Engineering in the 2011/2012 academic session. Over the years, the Department recorded steady progress in both staff and infrastructural development under her previous and current university managements. Through selfless service and relentless efforts, the Departmental staff struggled extremely hard despite the prevailing economic state of the educational sector of the nation to ensure we produce Engineers who are not only sound academically, but equally can compete excellently with their counterparts from other various Universities within and outside the country.

These departments run 5-year degree programmes leading to the award of the Bachelor of Engineering (B. Eng.) degree.

The Department currently has 250 undergraduate students broken down as follows:

100 Level = 80 students

200 Level = 28 students

300 Level = 42 students

400 Level = 40 students

500 Level = 60 students

Through selfless service and relentless efforts, the Departmental staff struggle extremely hard despite the prevailing economic state of the educational sector of the nation to ensure we produce Engineers who are not only sound academically, but equally can compete excellently with their counterparts in various universities within and outside the country.

SECTION2

OVERVIEW OF THE PROGRAMME

The Computer Engineering programme is designed to prepare the computer engineering graduate to acquire the requisite skills in the learning, literacy and life domains. The learning domain highlights critical thinking, creativity, collaboration and communication while literacy focuses on information, media, and technology complemented by the life skills that demonstrate flexibility, leadership, initiative, productivity and social balance. The Computer Engineering programme is conceived to produce engineers who can work with all aspects of computers (software and hardware) and other engineering professionals in a world in which high-level language software, complex programmes and smart hardware are complementing and progressively replacing human effort in solving societal problems.

The programme, therefore, prepares the students towards the design, analysis, and application of computers and computer-based systems in the development and production of peripheral and remote devices/computer systems to manage all economic sectors including agriculture, services, energy, infrastructure, health, environment, entertainment, sports and security. Furthermore, the programme is designed to prepare the learner for the increasing need for Human-Computer Interface (HCI) requiring higher levels of automation and control of all aspects of the cyber physical environment engendered by the expanding age of Internet of Things and People (IoTP).

The Computer Engineering Programme includes several courses in Computation, Computer Science (such as data structures and operating systems) and Electrical and Electronics Engineering (such as circuits and electronics). Graduates are expected to have a sound knowledge of the fundamentals in electrical or computer engineering that allows them to analyse and solve technical problems, apply hardware and software tools to problem solving, and create, develop and manage complex computer-based technologies, products and services. The primary areas of specialization are:

1. Artificial Intelligence (developing computers that simulate human learning and reasoning abilities)
2. Computer Architecture (designing new computer instruction sets, and combining electronic or optical components to yield powerful computing systems)
3. Computer Design and Engineering (designing new computer circuits, microchips, and other electronic computer components and devices)

4. Computer Theory (investigating the fundamental theories of how computers solve problems, and applying the results to other areas of computer engineering)

5. Information Technology (developing and managing information systems that support high-volume/speed data acquisition, processing, storage and retrieval for businesses and other organisations)

6. Operating Systems and Networks (developing the basic software used by computers to supervise themselves or to communicate with other computers, devices, humans and the environment)

7. Robotics (designing computer-controlled machines or robots for performing high- precision and high-speed repetitive industrial tasks and processes)

8. Software Applications (developing software to solve problems in multiple areas such as education, finance, space, medicine, infrastructure, etc.) and

9. Software Engineering (developing computer algorithms for solving complex problems of computation and analysis using different data forms).

This B.Eng./B.Sc./B.Tech. Computer Engineering Core Curriculum and Minimum Academic Standards (CCMAS) are approved by the National Universities Commission (NUC) for use in all Nigerian universities for the education and training of Computer Engineers. It is the product of the collaborative work of subject matter experts (SMEs) in the Nigerian universities and industry professionals/practitioners and regulators. It constitutes the latest revision to the National Universities Commission's (NUC's) B.Eng./B.Sc./B.Tech. Computer Engineering Benchmark Minimum Academic Standards (BMAS) which debuted in 2007. This new CCMAS contains many similarities with, as well as improvements over, equivalent programmes globally while also making allowance for individual Universities to create specialisation niches derived from environmental (local, international, industrial) need-based product differentiation.

Philosophy

The general philosophy of the Computer Engineering CCMAS is to produce graduates with hard, soft and research skills that are useful in analysing, evaluating, designing, developing, manufacturing, procuring, marketing, managing and maintaining the computing, electronics, communication, information processing, and operating systems embedded in computer hardware and devices used by individuals, and private and public organisations. To achieve this goal, students of the programme would be expected to take relevant courses and conduct research in approved topics in order to prepare them for any high level challenges in the profession. The

department will also embark on programs involving workshops training, industrial training schemes that will expose them to the methods and processes used in the manufacture, testing, operation and maintenance of digital designed plants and equipment and the associated office work.

Objectives

The broad objective is to produce graduates that have the requisite knowledge, skills and emotional disposition needed for a 21st century world that increasingly demands greater, more advanced, efficient, sustainable and client-centric technological solutions. Specific objectives include:

1. Applying the knowledge gained from courses in mathematics, science (social and basic), computing, and algorithmic reasoning to resolve Computer Engineering challenges individually or within multidisciplinary groups/teams;
2. Understanding and applying discrete mathematics and computation;
3. Defining complex engineering problems, collecting, analysing data and problems as well as developing models and implementing solutions for engineering problems;
2. Analysing, designing and optimally managing the hardware/software computer system requirements of organisations with constrained resources;
3. Using modern computer engineering models, tools, and information technologies to develop computer hardware;
4. Undertaking research, and laboratory and real-life and real-time experiments by using computers and computer-based devices/systems and having the ability to acquire, analyse, and interpret data and to solve engineering and other problems locally and globally;
5. Working on interdisciplinary and multidisciplinary concepts with teams as well as individually in developing new computer engineering knowledge, products, and services needed for the seamless functioning and wellbeing of society;
6. Appreciating and using life-long learning to improve self-employability as well as adapting to future professional and ethical responsibilities in an efficient, effective, fair, responsible and competitive manner;
7. Practising in different roles as engineering managers, project managers, innovators, entrepreneurs, quality controllers, researchers/knowledge creators and managers in the computer engineering field; and
8. Having an understanding of contemporary as well as legal and ethical issues impinging on

computer engineering solutions deployed in society.

Unique Features of the Programme

There are a number of unique features that characterise this computer engineering CCMAS curriculum:

1. A conscious duality focus in terms of preparing the students to ethically advance scientific knowledge as academics/researchers/trainers, and as culturally, environmentally sensitive and competent industry professionals;
2. More student directed learning, and reduction in classroom contact time by reducing each semester credits to between 15 – 18;
3. Increased application of the computer system and computer software in the programme in both teaching and learning;
4. Early familiarization of the students with the computer engineering discipline in terms of knowledge, skills and role expectations/responsibilities via an introductory course as early as the second semester of the first year of the programme;
5. 'Signature Courses' (SCs): an allowance of 30% of total credits required for graduation to be used by individual Universities to introduce 'signature' courses/programmes pursuant to developing in-demand/industry-relevant knowledge/skills /technologies that target specific industry groups so as to drive innovation and entrepreneurship, research (R&D) funding by associated industry groups, minimise educational tourism/brain drain; deliberately create knowledge/skill/product/service differentiation among computer engineering programmes in Nigerian Universities thereby leading to deeper specialisation, wider and global recognition, emergence of Centers of Excellence and Influence (CEIs) and increased economic growth and development;
6. Recommendation, and in some instances, outright prescription of cooperative or co- teaching for a course by resource persons from other disciplines/faculties in order to maximise learning;
7. Recommendation of the use of more real-life/real-time simulation/demonstration approaches and qualified/certified industry-based facilitators for the delivery of courses in order to deepen learning, approximate industry contexts as well as engender more town and gown (R&D) and funding collaboration; and
8. Capacity for increased skills in innovation, creativity and productive entrepreneurship orientation through the introduction of a capstone engineering business development and

management course in the final year of the programme.

Employability Skills

Based on this CCMAS, the Computer Engineering programme graduate will acquire requisite skills that will enable them to:

1. Apply knowledge of mathematics, science and computer engineering to the solution of local and global engineering problems;
2. Identify, formulate, research literature and analyse computer engineering problems and proffer informed, efficient and effective theoretical and practical solutions;
3. Design, develop and deploy computer-based systems, devices or processes to meet specified computer engineering needs;
4. Apply critical reasoning and logic in resolving engineering problems using research- based knowledge and research methods including the set-up of experiments, analysis and interpretation of data, and distilling of information to create new knowledge, products and services;
5. Create, select and apply appropriate techniques, resources and modern engineering and ICT tools, including prediction, modelling and optimisation to developmental and complex engineering activities, with a clear understanding of the theoretical and practical limitations;
6. Apply ethical principles at all times in practice as a subject matter expert and professional;
7. Function effectively as an individual and as a reliable collaborator, partner, team member or leader;
8. Communicate effectively on developmental or complex engineering activities;
9. Demonstrate knowledge of the principles of organisation, engineering, management, corporate social responsibility and finance; and
10. Exhibit evidence of independent and lifelong learning and community service.

21st Century Skills

The B.Eng./B.Tech./B.Sc. Computer Engineering CCMAS has the capability of inculcating into the graduate engineer skills essential for the 4th industrial revolution such as:

1. Critical thinking and problem solving
2. Creativity and innovation
3. Collaboration and team work
4. Communication and information literacy
5. Media literacy

6. Computation and data management
7. Technology literacy
8. Flexibility
9. Leadership and ethical responsibility
10. Initiative

The Programme Educational Outcomes(PEOs)

The Programme's Educational Objectives are geared towards the realization of national needs and aspirations. They are also designed with consideration to the visions and missions of the University. Table 2.1 presents the Programme Education Objectives.

Table 2.1: Programme Education Objectives

S/N	PEO
PEO1	Graduates will apply their knowledge of mathematics, science, and engineering principles to analyze and solve complex Computer engineering problems
PEO2	Graduates will demonstrate proficiency in using modern engineering tools, techniques, and software to design, model, simulate, and analyze Computer systems.
PEO3	Graduates will exhibit effective communication and teamwork skills, enabling them to collaborate with multidisciplinary teams and effectively convey technical information to diverse audiences.
PEO4	Graduates will engage in lifelong learning and professional development, pursuing advanced degrees, certifications, and continuing education opportunities to enhance their knowledge and skills in Computer engineering
PEO5	Graduates will demonstrate a strong commitment to ethical and professional responsibility in their engineering practice, considering societal, environmental, and economic factors while designing and implementing Computer systems.

Programme Outcomes and Graduate Characteristics

Programme Outcomes and Graduate Characteristics refers to the capabilities the graduate of the programme are expected to acquire from the training provided by the program.

Table 2.2 shows the relevant graduate characteristics.

Table 2.2: Programme Outcomes and Graduate Characteristics

S/N	Characteristic	Programme Outcome (Engineer Graduate Profile)
PO1	Engineering Knowledge	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in K1 to K4 respectively (see Annex A-2) to develop solutions to complex engineering problems
PO2	Problem Analysis	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development* (K1 to K4)
PO3	Design/ development of sustainable solutions	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required (K5)
PO4	Investigation	Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (K8)
PO5	Modern Tool Usage	Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems (WK2 engineering and K6)
PO6	The Engineer and the World	When solving complex engineering problems, analyse and evaluate sustainable development impacts* to: society, the economy,

		sustainability, health and safety, legal frameworks, and the environment (K1, K5, and
		K7).
PO7	Ethics	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (K9)
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (K9)
PO9	Communication	Communicate effectively and inclusively 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, taking into account cultural, language, and learning differences.
PO10	Project Management and Finance	Apply 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, and to manage projects and in multidisciplinary environments.
PO11	Lifelong learning:	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (K8)
PO12	Adapting Indigenous Technology and Local Materials in the agrarian communities	Apply engineering and technological principles to simplify, facilitate, modernize, and optimize traditional processes and methods in farming, harvesting, and food preservation; ability to employ locally sourced materials in providing engineering and technological solutions.

Knowledge Attribute Profile

The curriculum shall encompass the knowledge profile as summarised in the table 2.3:

Table 2.3: Knowledge Attribute Profile

S/No.	Attribute
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences
K2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling as it applies to Computer Engineering.
K3	A systematic, theory-based formulation of engineering fundamentals required in Computer Engineering.
K4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in Computer Engineering.
K5	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required.
K6	Knowledge of engineering practice (technology) in the practice areas in Computer Engineering..
K7	Knowledge of the role of engineering in society and identified issues in engineering practice in Computer Engineering, such as the professional responsibility of an engineer to public safety and sustainable development.
K8	Engagement with selected knowledge in the current research literature of Computer Engineering, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
K9	Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

The UN Sustainable Development Goals (UN-SDG) informed the development of these knowledge profiles.

Definition of Complex Problem Solving

The range of complex problem solving which the graduate of Computer Engineering must be capable of is defined in table 2.4.

Table 2.4: Range of Complex Problem Solving

Attribute	Complex Engineering Problems Characteristic
Depth of Knowledge Required	P1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2: Involve wide-ranging and/or conflicting technical, nontechnical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of analysis required	P3: Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models
Familiarity of issues	P4: Involve infrequently encountered issues or novel problems
Extent of applicable codes	P5: Address problems not encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	P6: Involve collaboration across engineering disciplines, other fields, and/or diverse groups of stakeholders with widely varying needs
Interdependence	P7: Address high level problems with many components or sub-problems that may require a systems approach

Definition of Complex Engineering activities

The range of complex engineering activities is defined in Table 2.5. Complex engineering activities refer to activities or projects that have some or all the characteristics of Table 2.5.

Table 2.5: Complex engineering activities

Attribute	Complex Activities
Preamble	Complex activities mean (*engineering*) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources including people, data and information, natural, financial and physical resources and appropriate technologies including analytical and/or design software

Level of interactions	A2: Require optimal resolution of interactions between wide-ranging and/or conflicting technical, non-technical, and engineering issues
Innovation	A3: Involve creative use of engineering principles, innovative solutions for a conscious purpose, and research-based knowledge
Consequences to society and the environment	A4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches.

SECTION 3

Admission and Graduation Requirements

Admission Requirements: Candidates are admitted into the degree programme in either of the following two ways:

1. Unified Tertiary Matriculation Examination (UTME) Mode (5 Year Degree Programme)

2. Direct Entry (DE) Mode (4 Year Degree Programme)

Unified Tertiary Matriculation Examination (UTME) Mode

For the five-year degree propgramme, in addition to acceptable passes in the Unified Tertiary Matriculation Examination (UTME), the minimum admission requirement is credit level passes in Senior School Certificate (SSC) in at least five subjects, which must include English Language, Mathematics, Physics, Chemistry and other acceptable science subjects at not more than two sittings.

Direct Entry (DE) Mode

For four-year Direct Entry, in addition to five (5) Senior School Certificate (SSC) credit passes which must include English Language, Mathematics, Physics and Chemistry, candidates with at least two passes in relevant subjects (Mathematics, Physics and Chemistry) at the GCE Advanced Level or IJMB or JUPEB may be considered for admission. Candidates who have good National Diploma (ND) result in relevant Engineering Technology programmes may also be considered for admission into 200 level. Holders of upper credit pass and above at Higher National Diploma (HND) level, are eligible for consideration for admission into 300 level.

Graduation Requirements

The degree title to be awarded under this CCMAS shall be a Bachelor of Engineering (B.Eng) or Bachelor of Science (B.Sc.) or Bachelor of Technology (B.Tech.) in Computer Engineering, as may be approved by the awarding University's Senate. Candidates must have registered and passed all the compulsory courses specified for the programme.

Candidates admitted through the UTME mode shall have registered for, at least, 150 units of courses during the 5-year (cumulative residency) degree programme The Computer Engineering programme shall be run according to the modularised course unit philosophy of this NUC CCMAS. All courses should, therefore, be sub-divided into more or less stand-alone but logically

consistent and progressive learning packages that are taught within a semester and examined at the end of the particular semester with the appropriate composite practical/field/project work, as may be the case. Credits are weights attached to a course. One credit is equivalent to one hour per week per semester of 15 weeks of lectures/tutorials or three hours of laboratory/studio/workshop work per week per semester of 15 weeks. The determination of the class of degree shall be based on the Cumulative Grade Point Average (CGPA) earned at the end of the programme. The CGPA shall be used in the determination of the class of degree.

SECTION4

ACADEMIC MATTERS

Grading of Courses

Grading of courses shall be done by a combination of percentage marks and letter grades translated into a graduated system of Grade Point as shown in Table 4.1.

Table 4.1: Grading Point System

Mark %	Letter Grade	Grade Point
70–100	A	5
60–69	B	4
50–59	C	3
45–49	D	2
40–44	E	1
< 40	F	0

Grade Point Average and Cumulative Grade Point Average

For the purpose of determining a student‘s standing at the end of every semester, the Grade Point Average (GPA) system shall be used. The GPA is computed by dividing the total number of Units x Grade Point (TUGP) by the total number of units (TNU) for all the courses taken in the semester as illustrated in Table 4.2. The Cumulative Grade Point Average (CGPA) over a period of semesters is calculated in the same manner as the GPA by using the grade points of all the courses taken during the period.

Probation

A student whose Cumulative Grade Point Average is below 1.00 at the end of a particular year of study, earns a period of probation for one academic session. A student on probation is allowed to register for courses at the next higher level in addition to his/her probation level courses provided that:

1. The regulation in respect of student work-load is complied with; and
2. The pre-requisite courses for the higher-level courses have been passed.

Withdrawal

A candidate whose Cumulative Grade Point Average is below 1.0 at the end of a particular year of

probation should be required to withdraw from the programme. However, in order to minimize waste of human resources, consideration should be given to withdrawal from programme of study and possible transfer to other programmes within the same University.

Table 4.2: Calculation of GPA or CGPA.

Course	**Units**	**Grade Point**	**Unit x Grade Point**
C_1	U_1	GP_1	U_1 x GP_1
C_2	U_2	GP_2	U_2 x GP_2
-	-	-	-
-	-	-	-
C_i	U_i	GP_i	U_i x GP_i
-	-	-	-
-	-	-	-
C_N	U_N	GP_N	U_N x GP_N
TOTAL	**TNU**		**TUGP**

$$TNU = \sum_{i=1}^{N} U_i \qquad TUGP = \sum_{i=1}^{N} U_i * GP_i \qquad CGPA = \frac{TUGP}{TNU}$$

Evaluation Techniques of Student Assessment

Practicals

By the nature of the programmes in Engineering and Technology, laboratory practicals are very important in the training of students. To reflect the importance of practical work, a minimum of 9 hours per week or 135 hours per semester (equivalent to 3 units) should be spent on students‘ laboratory practicals. Consequently, some of the courses have both theory and practical components. Thus, in the description of courses to be taken, the number of lecture hours (LH) and the number of practical hours (PH) per semester are indicated. The overall performance of students in such courses is to be based on the evaluation of the performance in written examination (which tests theory) and also the performance in the laboratory work (based on actual conduct of experiments and the reports). The experiments to achieve the practical‘s components of the courses must be designed in quality and quantity to enrich the grasp of the theoretical foundations of the courses. It is left for the department to organize all the experiments in the best way possible. One of the ways to achieve this is to lump all the laboratory practicals under a course, which the student must pass.

Tutorials

The timetable for courses shall be designed to make provision for tutorials of at least one hour for every four hours of lecture. Thus a 3-unit course of 45 hours per semester should attract about 10 hours of tutorials. Postgraduate students are normally employed to help in giving tutorials to undergraduate students. This is a veritable training ground for academic career.

Continuous Assessments

Continuous assessment shall be done through essays, tests and practical exercises.

1. Scores from continuous assessment shall normally constitute 30 per cent of the full marks for courses which are primarily theoretical.
2. For courses which are partly practical and partly theoretical, scores from continuous assessment shall constitute 40% of the final marks.
3. For courses that are entirely practical, continuous assessment shall be based on a student‘s practical work or reports and shall constitute 100% of the final marks.

Examinations

In addition to continuous assessment, final examinations should normally be given for every course at the end of each semester. All courses shall be graded out of a maximum of 100 marks comprising:

Final Examination: 60% –70% Continuous assessment (Quizzes, Homework, Tests, Practical‘s): 30% - 40%Each course shall normally be completed and examined at the end of the semester in which it is offered.

External Examiner System

This system should be used only in the final year of the undergraduate programme to assess final year courses and projects, and to certify the overall performance of the graduating students, as well as the quality of facilities and teaching in the faculty.

SECTION 5

CURRICULUM

Table 5.1: Course List according to Semesters

100 LEVEL

100 LEVEL - FIRST SEMESTER			
Course Code	**Course Title**	**Units**	**Status**
ENG 111	Introduction to Engineering	1	C
MTH 112	Elementary Mathematics I	3	C
PHY 111	General Physics I	2	C
PHY 112	Elementary Physics I	2	C
PHY 117	General Physics Lab I	1	C
CHM 113	General Chemistry I	3	C
CHM 114	Practical Chemistry I	1	C
UGC 111	Farm Practice	1	C
GSS 111	Use of English I	1	C
GSS 112	Nigerian History	2	C
GSS 114	Elementary French I	1	C
GSS 115	Basic German I	1	C
GSS 116	Use of Library	1	C
	Total	**20**	

100 LEVEL – SECOND SEMESTER			
Course Code	**Course Title**	**Units**	**Status**
ENG 121	Introduction to Computer	2	C
MTH 122	Elementary Mathematics II	3	C

MTH 123	Introduction to Vectors	2	C
PHY 121	General Physics II	2	C
PHY 122	Elementary Physics II	2	C
PHY 127	Physics Lab II	1	C
CHM 121	General Chemistry II	3	C
CHM 124	Practical Chemistry II	1	C
	Total	**20**	

COURSE LISTING

200 LEVEL

200 LEVEL - FIRST SEMESTER			
Course Code	**Course Title**	**Units**	**Status**
ENG 211	Thermodynamics I	3	**C**
ENG 212	Workshop Technology/Practice	2	C
ENG 213	Applied Electricity	3	C
ENG 214	Engineering Drawing I	2	C
ENG 215	Applied Mechanics	3	C
MTH 211	Mathematical Methods I	3	C
MTH 214	Linear Algebra I	2	C
GSS 212	Peace & Conflict Resolution Studies	2	C
GSS 217	Philosophy and Logic	2	C
	Total	**22**	

200 LEVEL – SECOND SEMESTER			
Course Code	**Course Title**	**Units**	**Status**
ENG 221	Strength of Materials I	2	**C**
ENG 222	Engineering Drawing II	2	C
ENG 223	Computer Programming	3	C
ENG 224	Materials Science	2	C
ENG 225	Fluid Mechanics I	2	C
ENG 226	Engineer in Society	1	C
MTH 221	Mathematical methods II	3	C
ENG 200	Student Work Experience Program(SWEP) I	1	C
STA 224	Statistics for Physical Science & Engineering	3	C
GNT 221	Entrepreneurial Studies	2	C
	Total	**21**	

300 LEVL

300 LEVEL FIRST SEMESTER

Course Code	*Course Title*	*Units*	*Status*
CSE 312	OPERATING SYSTEM I	2	C
CSE 313	SYSTEM ANALYSIS & DESIGN	2	C
CSE 314	ELECTRONIC CIRCUIT AND DEVICES	2	C
CSE315	DIGITAL/PHYSICAL ELECTRONICS	2	C
CSE 316	DIGITAL SYSTEM DESIGNS AND LOGIC FAMILY	2	C
CSE 317	ASSEMBY PROGRAMMING LANGUAGE	2	C
EEE312	CIRCUIT THEORY 1	2	C
ENG311	ENGINEERING ECONOMICS	2	C
ENG 313	ENGINEERING ANALYSIS	3	C
GNT 311	BUSINESS DEVELOPMENT AND MANAGEMENT	2	C
	Total	**21**	

300 LEVEL SECOND SEMESTER

Course Code	*Course Title*	*Units*	*Status*
CSE 321	PRINCIPLES OF TELECOMMUNICATION	2	C
CSE 322	SOFTWARE ENGINEERING	2	C
CSE 323	INFORMATION TECHNOLOGY	2	C
CSE324	SIGNALS AND SYSTEMS	2	C
CSE 326	INTRODUCTION TO ROBOTICS	2	C
CSE 325	ALGORITHM & DATA STRUCTURE	2	C
CSE 326	OPERATING SYSTEM II	2	C
CSE 327	DIGITAL SYSTEMS DESIGN	2	C
CSE329	INTRODUCTION TO ROBOTICS	2	C
EEE328	MEASUREMENT AND	2	C

	INSTRUMENTATION		
ENG326	TECHNICAL REPORT WRITING AND PRESENTATION	1	C
	Total	20	

400 LEVEL

400 LEVEL FIRST SEMESTER

Course Code	***Course Title***	***Units***	***Status***
CSE 411	STRUCTURED PROGRAMMING	2	C
CSE 412	FUNDERMENTALS OF MICROPROCESSORS/MICROCONTROLLERS	2	C
CSE 413	LABORATORY PRACTICALS	3	C
CSE 415	DATA COMMUNICATION	2	C
CSE 416	COMMERCIAL PROGRAMMING LANGUAGE	2	**C**
CSE 416	FEEDBACK AND CONTROL	2	C
CSE418	DIGITAL COMMUNICATION SYSTEM I	2	C
ENG418	COMPUTATIONAL METHODS IN ENGINEERING	3	C
GNT411	PRACTICUM	2	C
	Total	**20**	

400 LEVEL SECOND SEMESTER

Course Code	***Course Title***	***Units***	***Status***
CSE 400	SIWES: Students Work Experience Scheme	15	C
	Total	**15**	

500 LEVEL

500 LEVEL FIRST SEMESTER

Course Code	***Course Title***	***Units***	***Status***
CSE 511	SOLID STATE ELECTRONICS	2	C
CSE 512	COMPUTER ARCHITECTURE	2	C
CSE 513	COMPUTER ENGINEERING LAW AND MANAGEMENT	2	C
CSE 514	DIGITAL COMMUNICATION SYSTEMS II	2	C
CSE 515	REAL TIME COMPUTING & CONTROL	2	C
CSE 516	ARTIFICIAL INTELLIGENCE	2	C
CSE 517	OPERATIONS RESAERCH	2	C
CSE 518	SOFTWARE PROJECT MANAGEMENT	2	C
CSE 519	SEMINAR	1	C
CSE 519	PROJECT	2	C
CSE 510	COMPUTER MODELLING AND SIMULATION	2	C
	Total	**22**	

500 LEVEL SECOND SEMESTER

Course Code	***Course Title***	***Units***	***Status***
CSE 520	COMPUTER GRAPHICS	2	C
CSE 521	DIGITAL COMPUTER NETWORKS	2	**C**
CSE 522	ADVANCED SYSTEMS PROGRAMMING	2	**C**
CSE 523	INSTRUMENTATION ENGINEERING	3	**C**
CSE 524	ADVANCED COMPILER WRITING	3	**C**

	TECHNIQUES		
CSE 525	COMPUTER INSTALLATION & MAINTENANCE	3	**C**
CSE 526	NEURAL NETWORKS	2	E
CSE 527	DIGITAL SIGNAL PROCESSING	2	C
CSE 528	ASSEMBLER, TRANSLATOR, COMPILER CONSTRUCTION	2	**E**
CSE 500	PROJECT	6	C
	Total	18	

COURSES DESCRIPTION

ENG 111 INTRODUCTION TO ENGINEERING (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Explain the History and philosophy of science, Engineering and Technology
2. Explain the origin and nature of man; man and his economic environment; scientific methodology
3. Describe science and technology in the society and service of man
4. Identify Renewable and non-renewable resources; Man and his energy resources
5. Highlight the Environmental effects of chemicals, plastics, textiles, wastes and other materials. Chemical and radio-chemical hazards

Identify the various areas of science and technology

Course Content

History- Engineering and Technology: Man-his origin and nature; man and his economic 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 chemicals, plastics, textiles, wastes and other materials. Chemical and radio-chemical hazards. Introduction to the various areas of science and technology.

ENG 121: INTRODUCTION TO COMPUTER APPLICATION AND INFORMATION TECHNOLOGY

(2 CREDITS)

Course Learning Outcomes (CLOs)

1. Present the overview of Computer Application
2. Explain Data processing Application and Computations involving Microsoft Excel (Spreadsheet); involving Microsoft power point
3. Know Introduction to computer power point application and software
4. Understand the Use of computer software for solving mathematical problems

Know the Management information system and Networks: information Technology; Network and securities etc

Course Content

History of computers. Generations and classification of computers. IPO model of a computer. Components of a computer system – hardware and software. Programming languages, organization of data. Data capture techniques. Introduction to computer networks. Software and its application. Use of keyboard as an input device. DOS, windows, word processing, spreadsheets. Application of computers in Medicine, Social Sciences, Humanities, Education and Management Sciences. Modes of computer operation- standalone, multitasking, networks; Introduction to computer networks, the internet, multimedia systems, wireless application etc.

CHM 113 GENERAL CHEMISTRY I (3 Credits)

Course Learning Outcomes (CLOs)

1. State and explain the Basic principles of matter and energy from the chemist's point of view
2. Explain the atomic theory and molecular structure, stoichemistry, and the periodic classification of the elements
3. Explain the atomic structure, chemical bonding, properties of gases, solids, liquids and solutions
4. Describe chemical equilibrium, ionic equilibrium, chemical thermodynamics

Explain the electro-chemistry and chemical kinetics (includes laboratory sessions)

Course Content

Basic principles of matter and energy from the chemist's point of view: atomic theory and molecular structure, stoichemistry, the periodic classification of the elements, atomic structure, chemical bonding, properties of gases, solids, liquids and solutions, chemical equilibrium, ionic equilibrium, chemical

thermodynamics, electro-chemistry and chemical kinetics (includes laboratory sessions).

CHM 114 PRACTICAL CHEMISTRY I (1 CREDIT)

Course Learning Outcomes (CLOs)

1. State the general laboratory rules and safety procedures
2. Collect scientific data and correct carry out chemical experiments
3. Record observations and measurements in the laboratory notebooks

Analyse the data to arrive at scientific conclusions.

Course Content

Laboratory exercises drawn from CHM 113.

CHM 121 GENERAL CHEMISTRY II (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Know the application of the principles of chemical and physical change to the study of the behaviour of matter and the interaction between matters
2. Understand the chemistry of representative elements and their common compounds with emphasis on gradation of their properties
3. Explain the chemistry of the first series of transition elements
4. Know the general principles of extraction of metals

Understand introductory nuclear chemistry (includes Lab Sessions)

Course Content

Application of the principles of chemical and physical change to the study of the behaviour of matter and the interaction between matters. Course content includes, the chemistry of representative elements and their common compounds with emphasis on gradation of their properties – brief chemistry of the first series of transition elements, general principles of extraction of metals; introductory nuclear chemistry (includes Lab Sessions).

CHM 124 PRACTICAL CHEMISTRY II (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Explain the theory and practice of simple volumetric and qualitative analyses
2. Describe simple organic preparations

3. Explain the reactions of functional groups and physical determinations

Course Content

The theory and practice of simple volumetric and qualitative analyses, simple organic preparations, reactions of functional groups and physical determinations.

PHY 111: GENERAL PHYSICS I (Mechanics and Properties of Matter) (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain the Relevance of physics to Agriculture
2. Describe Fundamental and Derived Units, Dimensions, vectors; addition and subtraction of vectors
3. Solve problems involving vectors, scalar and vector products. Equilibrium
4. Discuss the principle of moments, centre of gravity and its applications in agriculture
5. Kinematics: displacement, velocity and acceleration. Projectile motion, circular motion, simple Harmonic motion. Dynamics
6. State and explain Newton's laws of mechanics, Elastic and inelastic collision, modulus of elasticity; statics friction, inertia, moment of inertia and torque, properties of matter
7. Describe the Archimedes principle, fluid pressure, blood pressure

Course Content

Relevance of physics to Agriculture, Fundamental and Derived Units, Dimensions, vectors; addition and subtraction of vectors. Resolution of vectors, scalar and vector products. Equilibrium. The principle of moments, centre of gravity and its applications in agriculture. Kinematics: displacement, velocity and acceleration. Projectile motion, circular motion, simple Harmonic motion. Dynamics; Newton's laws of mechanics, Elastic and inelastic collision, modulus of elasticity; statics friction, inertia, moment of inertia and torque, properties of matter, Archimedes principle, fluid pressure, blood pressure.

PHY 112 ELEMENTARY PHYSICS I (2 Credits)

Course Learning Outcomes (CLOs)

1. Describe Space and Time, units and dimensions, frames of reference and Kinematics
2. State and explain the Fundamental laws of mechanics, statics and dynamics, work and energy, conservation laws and Galilean Invariance

3. Explain Universal gravitation, rotational dynamics and angular momentum
4. Describe Molecular treatment of properties of matter, elasticity, Hooke's law and Young's shear and bulk moduli
5. Explain Hydrostatics, Pressure, buoyancy, Archimedes' principle, hydro-dynamics; streamlines
6. State and explain Bernoulli and continuity equations, turbulence, Reynold's number, laminar flow, Poiseuile's equations
7. Explain Surface tension, adhesion cohesion, capillarity, drops and bubbles, temperature; zeroth

law of thermodynamics, heat laws of thermodynamics, gas laws, kinetic theory of gases, applications

Course Content

Space and Time, units and dimensions, frames of reference, Kinematics, Fundamental laws of mechanics, statics and dynamics, work and energy, conservation laws, Galilean Invariance, Universal gravitation, rotational dynamics and angular momentum. Molecular treatment of properties of matter, elasticity, Hooke's law, Young's shear and bulk moduli, Hydrostatics, Pressure, buoyancy, Archimedes' principle, hydro-dynamics; streamlines, Bernoulli and continuity equations, turbulence, Reynold's number, laminar flow, Poiseuile's equations, Surface tension, adhesion cohesion, capillarity, drops and bubbles, temperature; zeroth law of thermodynamics, heat laws of thermodynamics, gas laws, kinetic theory of gases, applications.

PHY 117 GENERAL PHYSICS LABORATORY I (1 CREDITS)

Course Learning Outcomes (CLOs)

1. Elucidate the Relevance of physics to agriculture
2. Describe fundamental and derived Credits, dimensions, vectors; addition & subtractions of vectors, resolution of vectors, scalar & vector products
3. Explain Equilibrium, the principle of moments, centre of gravity and its application in agriculture
4. Describe kinematics displacement, velocity and acceleration, projectile motion, circular motion, simple harmonic motion
5. Explain Dynamics; elasticity; statics, friction, inertia, moment of inertia and torque, properties of matter

State and explain Archimedes principle fluid pressure, blood pressure

Course Content

Relevance of physics to agriculture, fundamental and derived Credits, dimensions, vectors; addition &

subtractions of vectors, resolution of vectors, scalar & vector products. Equilibrium, the principle of moments, centre of gravity and its application in agriculture, kinematics displacement, velocity and acceleration, projectile motion, circular motion, simple harmonic motion. Dynamics; elasticity; statics, friction, inertia, moment of inertia and torque, properties of matter, Archimedes principle fluid pressure, blood pressure.

GSS 111: USE OF ENGLISH I (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Identify possible sound patterns in English Language
2. Classify word formation processes
3. Demonstrate an appreciable level of the art of public speaking and listening
4. Write simple and technical reports.
5. Present the finished research report. Reading comprehension: the outline note, summary writing, genre and techniques of reading comprehension: scanning, skimming, intensive/extensive reading, word/text attack skills
6. Explain the SQ3R techniques, varieties of English and Levels of Usage, vocabulary development:

word choice and usage denotation and connotation. Term paper writing and submission

Course Content

Listening comprehension: note taking during lectures, note taking from audio-visual equipment, concentration signals and cues as aids to listening comprehension. Phonetics. Reading comprehension: the outline note, summary writing, genre and techniques of reading comprehension: scanning, skimming, intensive/extensive reading, word/text attack skills, SQ3R techniques, varieties of English and Levels of Usage, vocabulary development: word choice and usage denotation and connotation. Term paper writing and submission.

GSS 116: USE OF LIBRARY (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Explain History of libraries, Library and Education
2. Identify the types of Libraries (university libraries), study skills (Reference Services), types of library materials

3. Understand the use of library resources (including e-learing, e-materials, etc)
4. Understand library catalogues (Card, OPAC, etc,) and classification
5. Explain Copyright and its Implications
6. Explain Database Resources, Bibliography citation and referencing, Plagiarism
7. ENG 121 (Computer Applications and Information Technology)
8. Present the overview of Computer Application
9. Explain Data processing Application and Computations involving Microsoft Excel (Spreadsheet); involving Microsoft power point
10. Know Introduction to computer power point application and software
11. Understand the Use of computer software for solving mathematical problems

Know the Management information system and Networks: information Technology; Network and securities etc

Course Content

The use of the Library and Basic Research Methods: Types of Libraries, forms of Library services, cataloguing and book classification schemes, process of data collection/analysis, research writing, process and technique, documentation, references, notes and bibliography, abbreviations in research writing, the finished research report.

GSS 112: NIGERIAN HISTORY (2 CREDIT)

Course Learning Outcomes (CLOs)

1. Understand the cultures of the peoples of Nigeria
2. Understand the political institutions in Nigeria
3. Understand the Economic Institutions in Nigeria
4. Understand the environment and health practices in Nigeria
5. Explain the Nigerian economic institutions, Nigerian political institutions. Education and development in Nigeria. Religion in Nigerian culture
6. GSS 114 (Elementary French I)
7. Explain the Introduction au pays La FRANCE et à [l]a language francaise
8. Explain the Developpement de la langue à travers le monde. La Francophonie et les habitants des pays

9. Describe Pourquoi le francais au Nigeria. La contribution de la France dans le développement de l'Agriculture, de la Science et de la Technologie. Les salutations quotidiennes et usuelles. Preséntation de soi et d'autrui: nom, profession
10. adresse, et nationalité etc. Les professions dans le secteur agricole. Le personnel de l'université.. identification des gens et des objets communs. Les nombres car dinaux et ordinaux. S'orienter: trouver son chemin dans le campus

Interrogation et negation a base des verbes les plus usages chaque jour

Course Content

The concept of culture, pre-colonial cultures and languages of Nigeria. Principles of kinship. Descent and marriage in Nigerian cultures. Nigerian economic institutions, Nigerian political institutions. Education and development in Nigeria. Religion in Nigerian culture. Culture, environment and health practices in Nigeria.

GSS 114: ELEMENTARY FRENCH 1 (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Explain the Introduction au pays La FRANCE et à [l]a language francaise
2. Explain the Developpement de la langue à travers le monde. La Francophonie et les habitants des pays
3. Describe Pourquoi le francais au Nigeria. La contribution de la France dans le développement de l'Agriculture, de la Science et de la Technologie. Les salutations quotidiennes et usuelles. Preséntation de soi et d'autrui: nom, profession
4. adresse, et nationalité etc. Les professions dans le secteur agricole. Le personnel de l'université.. identification des gens et des objets communs. Les nombres car dinaux et ordinaux. S'orienter: trouver son chemin dans le campus

Interrogation et negation a base des verbes les plus usages chaque jour

Course Content

Introduction au pays La FRANCE et à [l]a language francaise. Developpement de la langue à travers le monde. La Francophonie et les habitants des pays. Pourquoi le francais au Nigeria. La contribution de la France dans le développement de l'Agriculture, de la Science et de la Technologie. Les salutations quotidiennes et usuelles. Preséntation de soi et d'autrui: nom, profession, adresse, et nationalité etc. Les professions dans le secteur agricole. Le personnel de l'université.. identification des gens et des objets communs. Les nombres car dinaux et ordinaux. S'orienter: trouver son chemin dans le campus. Interrogation et negation a base des verbes les plus usages chaque jour.

GSS 115: BASIC GERMAN I (1CREDIT)

Course Learning Outcomes (CLOs)

1. Pronounce alphabet (A, B, C, D, E, etc) vowels (A, E, I, O, U), Diphthongs (ai, ei, ou, eu, oi, ui) and consonants (b, c, d,)
2. Differentiate verbs int: Starke, schwache, and Hilfsverb
3. Conjugate verbs into presens, Imperfekt, Plusquam perfekt, Futur I, Futur II. Deklination of nouns (substantiv); Pronouns (Wir, Ich, du, sie, er, es, 1hr, Sie)
4. Know the use of definite and indefinite articles – der, die, das, ein, eine, and their declinations
5. Know the use of betimmte and umbestimte Numerale, as well as Adjective and its comparison
6. Know use of capital leters and its importance. Alltag usages-days of the week, season of the year, timing, the months

Know the use of Negation –nicht. Interrogation-weiche, was, warum, wer; Hilfsverbs- sein, haben

Course Content

Pronunciation of alphabet (A, B, C, D, E, etc) vowels (A, E, I, O, U), Diphthongs (ai, ei, ou, eu, oi, ui) and consonants (b, c, d,). Differentiation of verbs int: Starke, schwache, and Hilfsverb. Conjugation of verbs into presens, Imperfekt, Plusquam perfekt, Futur I, Futur II. Declination of nouns (substantiv); Pronouns (Wir, Ich, du, sie, er, es, 1hr, Sie). The usə of definite and indefinite articles – der, die, das, ein, eine, and their declinations. The use of betimmte and umbestimte Numerale, as well as Adjective and its comparison. Use of capital leters and its importance.

Alltag usages-days of the week, season of the year, timing, the months. The use of Negation –nicht. Interrogation-weiche, was, warum, wer; Hilfsverbs- sein, haben.

PHY 121; GENERAL PHYSICS II (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Describe Waves; Dynamics of waves. The wave equation, characteristics of waves, stationary waves. Light waves and its characteristics
2. Explain Imaging, sound wave. Doppler effects. The converging lens. Refraction at plane surfaces
3. Explain Electricity; electrostatic force. Coulomb's law, electric field and electric potential
4. State and explain Ohm's law, Alternating current, Magnetism; magnetic effects of currents

5. Explain Permanent magnetism, Ferro-magnetism. Faraday's laws of induction

Describe the potentiometer and the white stone bridge. Concept of heat. Temperature and thermometers

Course Content

Waves ; Dynamics of waves. The wave equation, characteristics of waves, stationary waves. Light waves and its characteristics. Imaging, sound wave. Doppler effects. The converging lens. Refraction at plane surfaces. Electricity; electrostatic force. Coulomb's law, electric field and electric potential. Ohm's law, Alternating current, Magnetism; magnetic effects of currents. Permanent magnetism, Ferro-magnetism. Faraday's laws of induction. The potentiometer and the white stone bridge. Concept of heat. Temperature and thermometers.

PHY 122 ELEMENTARY PHYSICS II (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain Electrostatics, conductors and currents; dielectrics,
2. Explain magnetic field and induction;
3. State Maxwell's equations;
4. Explain Electromagnetic oscillations and waves applications

Course Content

Electrostatics, conductors and currents; dielectrics, magnetic field and induction; Maxwell's equations; Electromagnetic oscillations and waves; applications.

PHY 127 PHYSICS LABORATORY II (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Explain quantitative measurements, the treatment of measurement errors and graphical analysis
2. Apply the variety of experimental techniques
3. Understand the experiments including studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems
4. Explain light and heat energy
5. Explain viscosity

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 studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity.

MTH 112 ELEMENTARY MATHEMATICS I (3 Credits)

Course Learning Outcomes (CLOs)

1. Understand Functions: concept and notation. Polynomial and rational functions
2. Explain and solve problems involving Trigonometric, exponential, and logarithmic functions
3. Explain Limit and have the idea of continuity. The derivative as limit of rate of change
4. Know Differentiation of algebraic, trigonometric, exponential and logarithmic functions. Techniques of differentiation
5. Know the Application to curve sketching, maxima and minima, etc. Integration as inverse of differentiation
6. Solve problems of Definite and indefinite integrals. Methods of integration (substitution, partial fractions, parts). Application to geometry and mechanics

Course Content

Elementary set theory: subsets, union, intersection, compliments, Venn diagrams. Real numbers, integers, rational and irrational numbers; mathematical induction, real sequences and series; theory of quadratic equations; binomial theorem. Complex numbers; algebra of complex numbers, the Argand Diagram. De Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles, trigonometric identities, addition and factor formulae. General solution of trigonometric equations such as $aCos\phi + bSin\phi = c$. Matrices: Introduction to matrices, elementary operations on matrices, determinants of at most *3 x 3* matrices.

MTH 122 ELEMENTARY MATHEMATICS II (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand Functions: concept and notation. Polynomial and rational functions
2. Explain and solve problems involving Trigonometric, exponential, and logarithmic functions
3. Explain Limit and have the idea of continuity. The derivative as limit of rate of change
4. Know Differentiation of algebraic, trigonometric, exponential and logarithmic functions. Techniques of differentiation

5. Know the Application to curve sketching, maxima and minima, etc. Integration as inverse of differentiation
6. Solve problems of Definite and indefinite integrals. Methods of integration (substitution, partial fractions, parts). Application to geometry and mechanics

Course Content

Functions: concept and notation. Polynomial and rational functions. Trigonometric, exponential, and logarithmic functions. Limit and the idea of continuity. The derivative as limit of rate of change. Differentiation of algebraic, trigonometric, exponential and logarithmic functions. Techniques of differentiation. Application to curve sketching, maxima and minima, etc. Integration as inverse of differentiation. Definite and indefinite integrals. Methods of integration (substitution, partial fractions, parts). Application to geometry and mechanics.

MTH 123 INTRODUCTION TO VECTORS (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Solve Equations of straight lines, circles, ellipse, parabola and hyperbola
2. Understand Tangents and normal
3. Explain Vectors, laws of vector algebra
4. Know the Representation of vectors in 1-3 dimensions. Components, and direction cosines
5. Know the Addition of vectors, and multiplication of a vector by a scalar

Solve Scalar and vector products of two vectors, triple products, vector equation of a straight line and plane.

Course Content

Equations of straight lines, circles, ellipse, parabola and hyperbola. Tangents and normals. Vectors, laws of vector algebra. Representation of vectors in 1-3 dimensions. Components, and direction cosines. Addition of vectors, and multiplication of a vector by a scalar. Scalar and vector products of two vectors, triple products, vector equation of a straight line and plane

GSS 121: USE OF ENGLISH II (Basic Grammar & Varieties of Writing (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Study and discuss a recommended novel
2. Know the Basic Grammar: Sentence elements, sentence types and varieties,

3. Understand punctuation and capitalization, abbreviation in sentence construction, homonyms, synonyms, antonyms and acronyms, error identification and correction
4. Know the Writing Skills and varieties of writing: the paragraph – devices of coherence/logical connectors.

Identify the types of writing – narration, description, exposition, and argumentation

Course Content

Each student is required to study a recommended novel.

Basic Grammar: Sentence elements, sentence types and varieties, punctuation and capitalization, abbreviation in sentence construction, homonyms, synonyms, antonyms and acronyms, error identification and correction.

Writing Skills and varieties of writing: the paragraph – devices of coherence/logical connectors, types of writing – narration, description, exposition, argumentation.

GSS 124: ELEMENTARY FRENCH II (1CREDIT)

Course Learning Outcomes (CLOs)

1. Explain Les jours de la semaine, les mois de l'anneé, la date.
2. Describe Description physiques et psychologiques de soi et des autres personnes Quelle heure est- il.
3. Understand Description de la vie et des activities quotitienness; interrogation et negation.
4. Explain L'alphabet francsais et l' orthographe, introduction à la dictée
5. Explain Les adjectives possessifs, Le corps humain. A l'hôpital. En ville: à la poste, au marché, à

lagare, à la biblionthéque etc. Les autres moyens de transport. La famille, les vétements et les couleurs

Course Content

Les jours de la semaine, les mois de l'anneé, la date. Description physiques et psychologiques de soi et des autres personnes Quelle heure est-il? Description de la vie et des activities quotitienness; interrogation et negation. L'alphabet francsais et l' orthographe, introduction à la dictée. Les adjectives possessifs, Le corps humain. A l'hôpital. En ville: à la poste, au marché, à lagare, à la biblionthéque etc. Les autres moyens de transport. La famille, les vétements et les couleurs.

GSS 125: BASIC GERMAN II (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Know Saiziehre (Sentence Construction)
2. Understand definition of sentences, art and form of German sentences, Das Saizghid
3. Know the Use of Surfix and Prefix
4. Know the Use of big and small letters in sentences

Know the Conjugation of verbs

Course Content

Saiziehre (Sentence Construction): definition of sentences, art and form of German sentences, Das Saizghid. Use of Surfix and Prefix; Use of big and small letters in sentences; Conjugation of verbs.

GSS 126 SOCIAL SCIENCE (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain the global perspective of economics, institutions and developments
2. Explain the law of scarcity and the technological choices open to any society
3. Describe the Trade development with special reference to trade in primary products, imports substitution and export possibilities in Nigeria and Third World countries
4. Explain Nigeria's balance of payments and commercial policies. Economic integration or unions
5. Discuss the State and structure of economics of ECOWAS countries. Nigerian and ECOWAS

Know the prospects for industrialization, trade; fiscal and monetary policies for accelerated industrialization. Nigeria and the Economic Co-operation in Africa (ECA)

Course Content

A global perspective of economics, institutions and developments. The law of scarcity and the technological choices open to any society. Trade development with special reference to trade in primary products, imports substitution and export possibilities in Nigeria and Third World countries; Nigeria's balance of payments and commercial policies. Economic integration or unions. State and structure of economics of ECOWAS countries. Nigerian and ECOWAS; prospects for industrialization, trade; fiscal and monetary policies for accelerated industrialization. Nigeria and the Economic Co-operation in Africa (ECA).

MTH 211 MATHEMATICAL METHODS I (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain Series and tests for convergence in infinite sequences and series of numbers
2. Solve Equation of lines and planes
3. Explain Matrices determinants, eigen values and eigen functions
4. Know matrix solution of linear algebraic equations, dot and cross product of vectors, triple products, vector functions, the gradient, divergence and curl
5. Explain and solve problems involving Vector spaces. Linear dependence and independence

(Wronskians and Jacobians). Computer solution of matrices

Course Content

Series and tests for convergence if infinite sequences and series of numbers. Equation of lines and planes. Matrices determinants, eigen values and eigen functions, matrix solution of linear algebraic equations, dot and cross product of vectors, triple products, vector functions, the gradient, divergence and curl. Vector spaces. Linear dependence and independence (Wronskians and Jacobians). Computer solution of matrices.

MTH 214 LINEAR ALGEBRA I – (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain Vector spaces over the real field. Subspaces
2. Describe Linear independence, basis and dimension
3. Solve problems involving Change of basis. Linear transformations and their representation by matrices
4. Explain Range, null space and rank. Singular and non-singular transformations

Explain and solve problems involving Algebra of matrices. Systems of linear equations

Course Content

Vector spaces over the real field. Subspaces. Linear independence, basis and dimension. Change of basis. Linear transformations and their representation by matrices. Range, null space and rank. Singular and non-singular transformations. Algebra of matrices. Systems of linear equations.

ENG 211 THERMODYNAMICS I (3 Credits)

Course Learning Outcomes (CLOs)

1. Identify and explain Thermodynamic properties, energy relations and conservation. Paths and

processes

2. Explain Cycle analysis, reversibility
3. State the first law and second law of thermodynamics, entropy. Irreversibility and availability
4. Explain Air-standard cycles, power and efficiencies
5. Explain the steady state flow equation (Bernouli Equation) and application. Masses

Explain Elements of vibrated systems. Force and motion relationship in constrained mechanisms

Course Content

Thermodynamic properties, energy relations and conservation. Paths and processes. Cycle analysis, reversibility. The first law and second law of thermodynamics, entropy. Irreversibility and availability. Air-standard cycles, power and efficiencies. The steady state flow equation (Bernouli Equation) and application. Masses. Elements of vibrated systems. Force and motion relationship in constrained mechanisms.

ENG 212 WORKSHOP TECHNOLOGY/PRACTICE (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain Industrial safety: safety code of conduct and safety consciousness
2. Identify common sources of accidents in the work place. Accident prevention and control
3. Know the use of engineering measuring instruments: Calipers, gauges. Sheet metal work-layout and Blacksmiting hand tool, cutting, shaping, welding, brazing, soldering, bolting and riverting and working principles. Joints and fastenings
4. Explain Woodwork and Basic woodworking principle and tools. Types of joints, processing of timber
5. Know the Introduction to Industrial bolting and riveting. Safety: survey of sources of common accidents, accident prevention and control
6. Explain the Introduction to machine shop: lathe work: shaping, milling and grinding
7. Know the Electrical workshop practice: convention and application of colour, codes for cables, resistors, etc and signs
8. Explain the Use of simple electrical tools, machines, etc. Measurement and marking : for

Uniformity, circulatory, concentricity, etc

Course Content

Industrial safety: safety code of conduct and safety consciousness. Survey of common sources of accidents

in the work place. Accident prevention and control. Use of engineering measuring instruments: Calipers, gauges. Sheet metal work-layout and Blacksmithing hand tool, cutting, shaping, welding, brazing, soldering, bolting and reverting and working principles. Joints and fastenings: Woodwork: Basic woodworking principle and tools. Types of joints, processing of timber. Introduction to Industrial bolting and riveting. Safety: survey of sources of common accidents, accident prevention and control. Introduction to machine shop: lathe work: shaping, milling and grinding, Electrical workshop practice: convention and application of colour, codes for cables, resistors, etc and signs. Use of simple electrical tools, machines, etc. Measurement and marking : for Uniformity, circulatory, concentricity, etc.

ENG 213 BASIC ELECTRICAL ENGINEERING(3 CREDITS)

Course Learning Outcomes (CLOs)

1. Discuss the fundamental concepts of electricity
2. Solve problems related to electric and magnetic fields and circuits
3. State, explain and apply the basic DC circuit theorems
4. Solve complex problems related to Power in AC circuits

Course Content

Electrostatics. Concepts of electric charges. Coulomb's law. Gauss law and applications. Electric potential and field strength. Effect of dielectrics. Electromagnetism; the magnetic field; force on a conductor carrying current in a magnetic field. Applications. Electromagnetic induction. Magnetic circuits. Magnetic circuit calculations. Energy stored in magnetic field direct and current circuits; electric power and energy. Circuit elements. Sources, DC and AC circuits, network laws, theorems and principles. Simple transients. Alternating current circuit. Introduction to electric power generation.

Concept of vectors, phasors, complex operators. Definition of impedance, admittance, resistance reactance, acceptance; phasor diagrams for RLC circuits. Resonance. Power in ac circuits introduction to electrical installations.

ENG 214 ENGINEERING DRAWING I (2 CREDIT)

Course Learning Outcomes (CLOs)

1. Identify the Drawing instruments and the use of graphic tools
2. Know the Introduction to drawing, measuring, lettering and dimensioning of objects in various views/positions
3. Explain Engineering geometry. Projections: lines, planes and simple solids

4. Explain the Fundamentals of orthographic projection, first and third angle orthogonal projections, isometric projections
5. Know the Graphs, charts and presentation of data and results. Pictorial/freehand sketching.

Graphical calculus and Applications

Course Content

Drawing instruments and the use of graphic tools. Introduction to drawing, measuring, lettering and dimensioning of objects in various views/positions. Engineering geometry. Projections: lines, planes and simple solids. Fundamentals of orthographic projection, first and third angle orthogonal projections, isometric projections. Graphs, charts and presentation of data and results.
Pictorial/freehand sketching. Graphical calculus and Applications.

ENG 215 ENGINEERING MECHANICS (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain Statics: Laws of statics; system of forces and their properties
2. Solve Simple problems of statics
3. Explain Friction, Particle dynamics: Kinematics of plane motion
4. State Newton's law -kinetics of particles, momentum and energy methods. Kinetics of Rigid Bodies: two-dimensional motion of rigid bodies, energy and momentum. Mass, movement of inertia. Simple problems
5. Explain Simple harmonic motions. Concepts and types of mechanisms. Static and dynamic force analysis

Course Content

Statics: Laws of statics; system of forces and their properties; Simple problems. Friction, Particle dynamics: Kinematics of plane motion. Newton's law -kinetics of particles, momentum and energy methods. Kinetics of Rigid Bodies: two dimensional motion of rigid bodies, energy and momentum. Mass, movement of inertia. Simple problems. Simple harmonic motions.

GSS 217: PHILOSOPHY AND LOGIC (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Elucidate the overview of philosophy

2. Define and state uses of philosophy
3. Explain Philosophy and common sense; philosophy and myth; philosophy and religion
4. Describe philosophy and science – empiricism

Explain Metaphysics, ethics, epistemology, logic, existentialism

Course Content

An overview of philosophy. Definition and uses of philosophy. Philosophy and common sense; philosophy and myth; philosophy and religion; philosophy and science – empiricism. Metaphysics, ethics, epistemology, logic, existentialism.

GSS 212: PEACE AND CONFLICT RESOLUTION (2 CREDITS)

Course Learning Outcomes (CLOs)

- Know the basic concepts in peace and conflict resolution
- Explain peace as vehicle of unity and development, conflict issues
- Identify the types of conflicts e.g religious/ethnic/political/economic conflicts, type of conflicts and violence in Africa, indigenes/settlers phenomenon, peace-building, management of conflict and security
- Know the Elements of peace studies and conflict resolution. Dispute resolution (ADR), dialogue/ Arbitration in conflict resolution

Highlight the roles of international organization in conflict resolution, e.g. Economic Community of West

African State (ECOWAS) African Union, United Nations, communal/ indigenous conflicts, individual conflict, terrorism e.t.c

Course Content

This course focuses on basic concepts in peace, study and conflict resolution, this is of unity and development conflict issues. Types of 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.

ENG 221 STRENGTH OF MATERIALS I (2 Credits)

Course Learning Outcomes (CLOs)

1. Explain stress and strain; some simple states of stress and strain; stresses
2. Know the relationship between loading shearing forces and bending moment; composite shafts and torsional strain energy
3. Explain Deflection of beams, Macaulay's method, area moment method
4. State Maxwell's reciprocal rule
5. Explain built-in and continuous beam in various loading situations; Complex stress and strain
6. Explain Mohr's stress circle, principal stress and strain, electric constant and volumetric strain
7. Discuss St. Venant's theory; stress in composite materials, bending of plates; membranes. Stresses
8. Explain stresses in thin cylinders and spheres; thermal stresses; stresses in rivets, joints, etc. use of

strain gauge and other measuring devices

Course Content

Introduction to stress and strain; some simple states of stress and strain; stresses; relationship between loading shearing forces and bending moment; composite shafts and torsional strain energy. Deflection of beams, Macaulay's method, area moment method, Maxwell's reciprocal rule, built-in and continuous beam in various loading situations; Complex stress and strain, Mohr's stress circle, principal stress and strain, electric constant and volumetric strain; St. Venant's theory; stress in composite materials, bending of plates; membranes. Stresses; stresses in thin cylinders and spheres; thermal stresses; stresses in rivets, joints, etc. use of strain gauge and other measuring devices.

ENG 222 ENGINEERING DRAWING II (2 Credits)

Course Learning Outcomes (CLOs)

1. Explain the Projection of lines and laminae; auxiliary views and mixed projection
2. Prepare detailed work in drawings for production; semi-detailed drawings, conventional presentation methods
3. Assemble drawing of machines, devices and installation layout
4. Explain itemization and part-listing
5. Understand Drawing office practice and reprographics

6. Know the Connections in Engineering Drawing
7. Highlight the IS code of drawing. Conics and engineering curves – ellipse, parabola, hyperbola, cycloid, trochoid, involutes

Understand the Projection of planes and solids (cube, prison, pyramid, cylinder, core and sphere

Course Content

Projection of lines and laminae; auxiliary views and mixed projection. Preparation of detailed working drawings for production; semi-detailed drawings, conventional presentation methods. Assembly drawing of machines, devices and installation layout; itemization and part-listing. Drawing office practice and reprographics. Connections in Engineering Drawing. Introduction to IS code of drawing. Conics and engineering curves – ellipse, parabola, hyperbola, cycloid, trochoid, involutes. Projection of planes and solids (cube, prison, pyramid, cylinder, core and sphere

ENG 223 COMPUTER PROGRAMMING AND LANGUAGES (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain Computer, computing and engineering, algorithms flow chart and pseudo code
2. Describe the Computer languages, programming in FORTRAN? Or later versions
3. Explain the Debugging techniques. Computer code security. Laboratory
4. Explain the hands-on experience on computers through the use of 'Compilers to run programs' and to solve simple analysis problems in fluid

Explain the thermodynamics, heat transfer and electrical systems

Course Content

Computer, computing and engineering, algorithms flow chart and pseudo codes design. Computer languages, programming in BASIC, FORTRAN, C, C++ and newer versions. Debugging techniques. Computer code security.

Laboratory: Hands-on experience on computers through the use of 'Compilers to run programs and to solve simple analysis problems in fluid mechanics, thermodynamics, heat transfer and electrical systems. The development of discipline in program design, in style and expression, in debugging and testing, especially for large programs.

ENG 224 MATERIAL SCIENCE (2 Credits)

Course Learning Outcomes (CLOs)

1. Explain the Atomic and Molecular Structures, Crystals. Metallic States. Defects in Crystals, Conductors, Semi-conductors and Insulators
2. Describe the Alloy theory – application to industrial alloys steel in particular. Engineering Properties – their control. hot and cold working, heat treatment, etc
3. Explain the Principles of mechanical testing, impact test, tensile test, hardness tests, fatigue tests, creep test and non-destructive tests. Fracture. Corrosion and corrosion control
4. Explain Equilibrium and rate reaction. Non-metallic materials – glass, rubber, concrete, plastics, wood and ceramic materials
5. Explain the Electrical properties. Magnetic materials: properties and characteristics. Domia theory, magnetostic, anisotropy, losses, permanent magnets, transformers cores
6. Identify and describe Electric materials: Liquid, solid and organic dielectrics polymers: properties/characteristics, inorganic materials, piezoelectric and ferro-electric materials, composite structures, conductors, superconductors and insulators

Explain Reaction and Phase Equilibra: Reaction rate; Rate Laws. Mechanisms and theories of elementary processes; photo chemical reactions. Basic Electrochemistry

Course Content

Atomic and Molecular Structures, Crystals. Metallic States. Defects in Crystals, Conductors, Semi-conductors and Insulators. Alloy theory – application to industrial alloys steel in particular. Engineering Properties – their control. hot and cold working, heat treatment, etc. Principles of mechanical testing, impact test, tensile test, hardness tests, fatigue tests, creep test and non-destructive tests. Fracture. Corrosion and corrosion control. Equilibrium and rate reaction. Non-metallic materials – glass, rubber, concrete, plastics, wood and ceramic materials. Electrical properties. Magnetic materials: properties and characteristics. Domia theory, magnetostic, anisotropy, losses, permanent magnets, transformers, cores. Electric materials: Liquid, solid and organic dielectrics polymers: properties/characteristics, inorganic materials, piezoelectric and ferro-electric materials, composite structures, conductors, superconductors and insulators.

ENG 225 FLUID MECHANICS I (2 Credits)

Course Learning Outcomes (CLOs)

1. Know the definition of a fluid and state fluid properties
2. Explain Statics of fluid systems, pressure in a static fluid, momentary, forces on planes and curved surfaces
3. Explain Kinematics of fluid motion, streamlines, velocity, acceleration, rotation and circulation.

Buoyancy and floatation, stability of floating and submerged bodies. Types of flow, continuity equation, energy equation, momentum equation, fluid resistance, laminar and turbulent flow in fluids, flow in closed conduits boundary layer concepts

4. Derive the Euler and Bernoulli equations
5. Conduct the Differential analysis. Fluid measurements; pressure, velocity and flow rates
6. Explain the Hydraulics of pipe flow; hydraulic and energy grade lines, pipes in series, parallel pipes, branching pipes, network of pipes, deterioration of pipes
7. Explain the unsteady flow conduits, water hammer purge control

Conduct the Laboratory Measurement of fluid properties, stability of floating bodies

Course Content

Definition of a fluid and fluid properties. Statics of fluid systems, pressure in a static fluid, momentary, forces on planes and curved surfaces. Kinematics of fluid motion, streamlines, velocity, acceleration, rotation and circulation. Buoyancy and floatation, stability of floating and submerged bodies. Types of flow, continuity equation, energy equation, momentum equation, fluid resistance, laminar and turbulent flow in fluids, flow in closed conduits boundary layer concepts. The Euler and Bernoulli equations. Differential analysis. Fluid measurements; pressure, velocity and flow rates. Hydraulics of pipe flow; hydraulic and energy grade lines, pipes in series, parallel pipes, branching pipes, network of pipes, deterioration of pipes. unsteady flow conduits, water hammer purge control.

MTH 221 MATHEMATICAL METHODS II (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Elucidate the Review of differentiation and integration methods. Derivation of equations from physics, chemistry, biology, geometry etc.
2. Solve Ordinary differential equations
3. Know the Applications of first order differential equations. Second order linear equations. Linear dependence and independence
4. Know the Solutions of second order linear differential equations by method of undetermined coefficients and variation of parameters
5. Solve problems of Simple Laplace transformation. Solution of initial-value problems by Laplace transform method
6. Know the Computer solution of selected engineering problems. Excel package. Double

and triple integrals with applications, vector integration and vector integral theorems: divergence

7. Explain and solve problems associated with Green's - Stoke's theorems and applications.

Functions of more than one variable. Extremization of functions of many variables

Course Content

Review of differentiation and integration methods. Derivation of equations from physics, chemistry, biology, geometry etc. Ordinary differential equations. Applications of first order differential equations. Second order linear equations. Linear dependence and independence. Solutions of second order linear differential equations by method of undetermined coefficients and variation of parameters. Simple Laplace transformation. Solution of initial-value problems by Laplace transform method. Computer solution of selected engineering problems. Excel package.

Double and triple integrals with applications, vector integration and vector integral theorems: divergence Green's - Stoke's theorems and applications. Functions of more than one variable. Extremization of functions of many variables.

ENG 200: SWEP I (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Acquire industrial workplace perceptions, ethics, health and safety consciousness, interpersonal skills and technical capabilities needed to give them a sound engineering foundation;

2. Learn and practice basic engineering techniques and processes applicable to their specialisations;

3. Build machines, devices, structures or facilities relevant to their specific engineering programmes and applications; and

4. Acquire competence in technical documentation (log-book) and presentation (report) of their practical experiences.

ENG 226: ENGINEER IN SOCIETY (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Explain the Philosophy of science
2. Describe the History of Engineering and Technology
3. Identify the Safety in Engineering and conduct Risk Analysis

Discuss the Role of Engineers in Nation Building

Course Content

Philosophy of science. History of Engineering and Technology. Safety in Engineering and Introduction to Risk Analysis. The Role of Engineers in Nation Building. Invited Lectures from professionals

GNT 221: ENTREPRENEURSHIP STUDIES (ENTREPRENEURSHIP AND INNOVATION) (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Identify the Basic Engineering Business Settings
2. Review engineering business activities
3. Elucidate Introduction to organizational structure of manufacturing organization
4. Explain Entrepreneurship and new Venture creation:- Evolution of an industrial, domestic and commercial products to meet the need of the society
5. Draw Bill of Quantities
6. Identify materials- material location, quantity, quality and handling requirements, specification. Quality control and measurement
7. Carry out Cost estimation and marketing of products: market/product mix, market research and market strategy. Group technology task

Course Content

Basic Engineering Business Settings: - Review of engineering business activities Introduction to organizational structure of manufacturing organization. Entrepreneurship and new Venture creation:- Evolution of an industrial, domestic and commercial products to meet the need of the society. Drawing, Bill of Quantities. Identification of materials- material location, quantity, quality and handling requirements, specification. Quality control and measurement. Cost estimation and marketing of products: market/product mix, market research and market strategy. Group technology task.

ENG 311 ENGINEERING ECONOMICS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain the Basic economic concepts
2. Identify and explain the Factors of production
3. Explain Supply and demand. Price elasticity analysis
4. Describe Household behavior theories. Business organization. Production, the market, income employment – classical, non-classical and Keynesian approaches
5. Explain Money, Expenditure, Taxation, Budget, International trade. Cost analysis. Fixed and variable costs; Depreciation, capital cost. Cost recovery factor. Breakeven analysis

Course Content

Basic concepts, factors of production, supply and demand. Price Elasticity analysis. Household behavior theories. Business organization, production, the market, income employment - classical and keynesian approaches. Money, expenditure, taxation, budget, international trade. Cost analysis, fixed and variable cost, capital costs, cost recovery factor.

GNT 311: BUSINESS DEVELOPMENT AND MANAGEMENT (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Spot opportunities in problems and in high potential sectors, regardless of geographical location
2. State how original products, ideas and concepts are developed
3. Identify key sources of entrepreneurial finance
4. Develop a business concept for further incubation or pitching for funding

Course Content

This course is divided into two models. The first model covers some basic issues in business management. This model dwells on the following: leadership; And decision making processes. The first model is designed to keep the students with the requisite skill for effective interpersonal relationship management in the organization. The second model is on business development which consists of soft topics like : business, environment; co-operatives and information management. This model is expected to prepare the students on how to analyze market situations, make production plan, prepare financial plan and document a complete business plan. It will expose the student to the importance of co-operatives in business organization and process of forming a viral corporative organization as well as knowledge on the legal requirements in

registering a business. Finally, it will also expose students to the entry cases of new venture creation and document a business plan to get financial assistance from financial institutions and other venture capital agencies.

ENG 300: SWEP II (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Describe the process of designing and constructing engineering components and systems
2. Design and Construct a simple Electrical/Electronic system
3. Demonstrate proficiency in how to write engineering reports from lab work
4. Fill logbooks of all experience gained in their chosen careers

EEE 312: CIRCUIT THEORY I (2 CREDITS)

Course Learning Outcomes (CLOs)

1. State, explain and apply circuit theorems to dc circuits
2. Obtain the network response to certain input signals using phasor notations and diagrams
3. State and apply Laplace transforms to solve passive circuits
4. Plot Bode diagrams of a given transfer function

Course Content

Pre-requisite ENG 211

Network Theorems:

Thevenis, Nortons, Reciprocity, Compensation and maximum power transfer theorems.

AC Analysis by complex notation:

Review of Complex numbers:-

Complex impedances and admittances,

Solution of series and parallel circuits.

Resonance:-

Series and parallel resonance.

Two branch diagrams, Resonance applications.

Mesh and Node Analyses:-

Choice of mesh currents, Mesh equations by inspection, Node Analysis. Matrix methods.

Coupled circuits:- Analysis of coupled circuits. Coupling coefficient, Dot notation.

A.C Transients:-

RC and RL sinusoidal transients. RLC transients. Two mesh transients.

Poly-phase systems. Two phase and three-phase systems. Star-Delta and Delta-Star connected loads. Power in the three-phase systems. Star Wattmeter method applied to balanced loads.

Power factor Correction:-

Power in sinusoidal steady state average and apparent power complex power. Active and reactive power. Power factor correction.

Ideal Transformer:-

Basic theory of ideal transformer. Transformer efficiency, The auto transformer.

CSE 312 – OPERATING SYSTEM I (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand an operating system
2. Use OS as a resource manager
3. Explain the Functionality Mechanisms of OS

4. Design Issues influences

Course Content

Review:

Instruction sets, I/O and structure, addressing schemes microprogramming.

Dynamic Procedure Allocation:-

Procedure activation and de-activation on a stack include dynamic storage allocation, passing value and reference parameters establishing new local environments, Addressing mechanisms for accessing parameters (e.g. Displays, relative addressing in the stack). Implementing non-local references, Re-entrant programs, Implement.

System structure:-

Design methodologies such as level, abstract data types, monitors, kernels, mulei, networks of operating system modules.

Evaluation:-

Elementary queuing, network models of system, bottlenecks program behaviour, and statistical analysis.

Memory Management:-

Characteristics of the hierarchy of storage media, virtual memory, paging, segmentation. Policies and mechanisms for efficiency of mapping operations and multiprogramming, problems of auxiliary memory.

Name Management:

Limitations of linear address space, Implementation of tree-structured space of object for the support of modular programming.

Recovery Procedures:

Techniques of automatic and manual recovery in the system failures.

Operating Systems Implementation:

Pipelining and parallelism, User interface considerations. Introduction to telecommunication networks (including microcomputer) and distributed system.

CSE 313 –SYSTEM ANALYSIS AND DESIGN (2 CREDITS)

Course Learning Outcomes (CLOs)

1.Explain what is meant by system design.

2. Explain system specification

3. List the tools used for systems specification

4. Explain systems documentation (input, output, processing access mode etc.) and standards

5. Explain systems implementation, Explain test data

6. Define system evaluation, Explain the need for system evaluation.

7. Define systems maintenance, Describe the need for system maintenance.

Course Content

System concept, Define a system,

Classify systems into manual and automated systems. Compare systems in above.

List examples of manual and automated systems

Stages of system analysis,

Define system analysis

List the stages of systems development feasibility study, investigation analysis, design, programming, implementation, evaluation and maintenance.

Implementation process.

Describe the technique of fact finding

Define and select a system to be developed.

System Design:-

Explain what is meant by system design.

Explain system specification

List the tools used for systems specification

Explain systems documentation (input, output, processing access mode etc.) and standards

System Implementation:-

Explain systems implementation, Explain test data

System Evaluation:-

Define system evaluation, Explain the need for system evaluation.

System Maintenance:-

Define systems maintenance, Describe the need for system maintenance.

CSE 314 – ELECTRONIC CIRCUITS AND DEVICES (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Classify, describe and discuss the principles of operation and applications of FET and BJT;
2 Calculate amplifier parameters
3 Design simple amplifiers using BJT and FET with given specifications

Course Content

Free electron motion, static station-electric and magnetic fields, electronic structure of matter, conductors, insulators and semi-conductors. Electronics in metals, electron emissions, characteristics of some electron and photo-cell and light emitting diode.

Eliminatory discussion of IC and operational amplification techniques and operations.

Resonance, turned circuits and locus plot: frequency response, series resonance, frequency variations, universal resonance curve and bandwidth, parallel resonance, loci impedance or admittance plots, general locus plot, approximate locus plots and variable elements loci.

CSE 315 DIGITAL PHYSICAL ELECTRONICS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain the concept of free electron motion in static electric and magnetic field
2. Explain the concept electronic structure of matter and conductivity in crystalline solids
3. Discuss the theory of energy bands in conductors, insulators and semi-conductors

4 Explain the concept of electron emission, carrier and transport phenomena in semiconductors, behaviour of electrons in metals, and understand the characteristics of some electron and photo devices

5 Understand and explain the behaviour and mode of operations of Fields Effect Transistors, Silicon Controlled Rectifiers, Vacuum Tubes, Photo Resistors, Diodes, Photocell, Light Emitting Diodes

and elementary Discrete Device

6 Understand the concept behind Integrated Circuit technology and its fabrication techniques

Course Content

Free electron motion, static station-electric and magnetic fields, electronic structure of matter, conductors, insulators and semi-conductors. Electronics in metals, electron emissions, characteristics of some electron and photo-cell and light emitting diode. Eliminatory discussion of IC and operational amplification techniques and operations. Resonance, turned circuits and locus plot: frequency response, series resonance, frequency variations, universal resonance curve and bandwidth, parallel resonance, loci impedance or admittance plots, general locus plot, approximate locus plots and variable elements loci.

CSE 316 – DIGITAL SYSTEM DESIGN AND LOGIC FAMILY (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Classify, describe and discuss the various logic gates and flip-flops and multivibrators
2. Design simple logic and sequential circuits using logic gates and flip-flops
3. Design and modify electronic circuits using Karnaugh Maps
4. Discuss the applications of Flip-flops

Course Content

Introduction to digital electronics, integrated circuits, numbering systems, Boolean algebra, gates, flip-flops, multiplexers, sequential circuits, combinational circuits, programmable logic devices, and computer architecture. Lecture and lab combination. Laboratory activities to include the design, construction, analysis, and measurement of basic digital systems. Prerequisite: Credit for or concurrent enrollment. Bipolar Transformer: Single stage Amplifier, Multiple Amplifier, Field effect Amplifiers, High frequency Amplifiers, Power Amplifiers, Voltage Regulations and Stabilizers, Feedback Oscillators, Pulse and Switching circuits, Waveform generators, Multi-vibrators. Introduction to the concepts and fundamentals of electronic devices, circuits and systems. An electronics overview course for technology majors. Topics

include direct current electricity, alternating current electricity, transistors and integrated circuits, amplifiers and oscillators, transmitters and receivers, digital logic circuits, electronic memory, and computers. Prerequisite: Credit for or concurrent enrollment.

CSE 317 – ASSEMBLY PROGRAMMING LANGUAGE (2 CREDITS)

Course Learning Outcomes (CLOs)

1.Explain the basic concepts of computer architecture and how assembly language interacts with hardware.

2. Describe the role of the CPU, memory, and input/output devices in executing assembly programs.

3. Identify and use the fundamental syntax and commands of assembly language.

4. Write simple assembly programs using basic instructions such as data movement, arithmetic operations, and control flow.

5. Approach programming problems with a machine-level mindset.

6. Break down complex problems into smaller, manageable tasks that can be implemented in assembly language.

7. Utilize debugging tools and techniques to identify and fix errors in assembly code.

8. Test and validate assembly programs to ensure they function as intended.

9. Convert between binary, decimal, and hexadecimal number systems.

10. Apply assembly programming skills to real-world scenarios, such as embedded systems or performance-critical applications.

11. Understand the relevance of assembly language in modern computing environments.

Course Content

General Machine Structure:

Program Counter, stack pointer, Instruction register, general purpose register, index register, instruction formats, implicit, relative, direct, indirect index, and absolute addressing. Interrupts Subroutines.

Structured Microcomputer Programming:

Look-up tables and applications, command decoders. Multi-level command programming. Practical exercises include sorting and searching in assembly language and structured Assembly Language program design. Practical hands on Microcomputer Programming experience will be emphasized.

CSE 321 -PRINCIPLES OF TELECOMMUNICATIONS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Discuss communication models for analog and digital signals

2 Explain the basic time and frequency domain characteristics of signals

3 Describe the basic principles of analog and digital modulation

4 Be familiar with the general principles of wireless communication

5 Explain the concept of noise and attenuation of signals in different transmission media

Course Content

Elements of communication systems:- Block diagram model fundamental limitations. Amplitude modulation. Angle modulation. Pulse modulation. Communication channels. Noise Detection, Radio propagation, Antennas, Transmitters and Receivers, Communication services. Introduction; review: modulation schemes, PAM, signal-space representation. CAP, BPSK, QPSK, offset QPSK, Pi/4-shifted QPSK, M-ary PSK, classification of modulation schemes. CAP, BPSK, QPSK, offset QPSK, Pi/4-shifted QPSK, M-ary PSK, classification of modulation schemes. Multichannel modulation, loading, waterfilling. Noise figure, radio link analysis, wireless communications, propagation effects: multipath, Doppler effect. Spectral waveform coding, model based coding, Shannon's measure of information: entropy, mutual information

CSE 322 – SOFTWARE ENGINEERING (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements;

2. Elicit, analyses and specify software requirements through a productive working relationship with various stakeholders of a software development project;

3. Function effectively as a team member;

4. Understand professional, ethical and social responsibility of a software engineer;

5. Participate in design, development, deployment and maintenance of a medium scale software development project;

6. Convey technical material through oral presentation to, and interaction with, an audience;

7. Convey technical material through written reports which satisfy accepted standards for

writing style;

8. Use Unified Modeling Language in software specification documents; and

9. Evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and merging software engineering trends, models, tools, and techniques.

Course Content

Program Design: formal models of structured programming demonstrations code reading and proof of correctness, stepwise refinement and re-organization, segmentation, Top-down and bottom-up design and development, Information hiding, iteration enhancements, structured design, strength and coupling measures, programme quality.

Data structures: (eg FORTAN IV and FORTRAN 77) or to any other high level language. Topics covered include Arithmetic and relation operators. Looping and transfer of control. Arithmetic – IF statements, Logical –IF statements, Do and continue statements, Computed GOTO statements, lists, Arrays, Subroutine subprograms. Type conversions and the structured terms in FORTRAN IF- THEN statements and IF-THEN ELSE statements. Data statements. Implicit statements. A comparison of the use of those structures in FORTRAN IV and FORTRAN 77 functions subprograms.

CSE 323 – INFORMATION TECHNOLOGY (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Evaluate the role of legal, ethical, and privacy issues within IT related to organizations.
2. Model a computer use policy that includes all employees' privacy, legal, and ethical considerations.
3. Describe the foundations of intellectual property.
4. Critique several transnational issues concerning intellectual Property
5. Explain common types of cyber-attacks and their corresponding detection methods.
6. Understand how to select appropriate detection methodologies for

specific types of cyber-attacks.

7. Analyze and interpret data collected from cyber-attack detection systems

8.. Understand the basic networking concepts, including the OSI model, network types, and network devices.

9. Demonstrate the ability to solve basic problems and perform basictroubleshooting operations on LANs and connected devices.

10. Express network systems' essential components and media and distinguish between LANs and WANs

11. Describe the role of data, information, and databases in organizations.

12. Describe mechanisms for data collection and their implications.

13. Describe basic data retention issues, including the need for retention, physical storage, backup, and security.

14. Demonstrate select, project, union, intersection, set difference, and natural join relational operations using simple example relations provided.

15. Contrast relational database concepts with non-relational databases, including object-oriented, XML, NewSQL, and NoSQL databases.

16. Evaluate data integrity and provide examples of entity and referential integrity.

17. Analyze how data fragmentation, replication, and allocation affect database performance.

18. Describe major concepts of object-oriented, XML, NewSQL, and NoSQL databases.

Course Content

Major features of Hyper Text Markup Language (HTHL)
The structure of an HTML document
IT Taps
Hyper Linked and images
Using Multimedia
Design of On-line forms
Web Page design Techniques
Mini project on an Online Application.
Information Processing: Computer and society system, information system, operational features. Data and

processing, processing cycle. Application of up-to-date or state-of-the-art technology to information system. Data current advance in Data communication as applied to information systems etc. An introduction to networking (LAN,MAN,WAN) common carriers like AT&T GTE,NCI (telecoms); value added networks; the INTERNET and its predecessor Current advances.

CSE 324: SIGNALS AND SYSTEMS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Analyze and represent different types of signals and systems.
2. Apply mathematical tools such as convolution, Fourier transforms, and Laplace transforms to solve problems.
3. Understand the behavior of systems in both time and frequency domains.
4. Design and implement basic signal processing techniques for real-world applications

Course Content

Signal Analysis: Anology between vectors signals, orthogonal functions, periodic function by the Fourier series. Fourier transform and convolution. The sampling theorem. Transmission of signals and power density spectra; linear systems, filter characteristics of linear systems, bandwidth and the rise time. Energy and power density spectra. Modulation frequency and time multiplexing; amplitude transmission, and effect of frequency and phase. Angle modulation-narrow-band and wideband FM, square wave modulation, linear and none-linear modulation. Noise reduction characteristics of angle modulation. Generation of FM signals and demodulation of FM signals. Noise – short, thermal calculations, signal noise and noise of an amplifier.

CSE 325: ALGORITHM AND DATA STRUCTURE (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Learn the concept of the data structure collection of data; concepts of linear and nonlinear collections are introduced.
2. learn how arrays are constructed, along with demonstrating the features of the Array class. The Array class encapsulates,
3. learn the fundamentals of the data structure (or algorithm) and even build their own implementation.
4. Be introduced to the basic sorting algorithms, such as the bubble sort and the

insertion sort.

5. examine the most fundamental algorithms for searching memory, the sequential and binary searches.

6. Examine two classic data structures: the stack and the queue.

7. Exposed practical use of these data structures in solving everyday problems in data processing.

Course Content

Understanding the concepts of data structure and tools for studying, symbols, relations and graph. Programming strategies- introduction to object-oriented programming. Algorithm: definition of algorithm, types of algorithm, dynamic algorithm, greedy algorithm. Data structure – arrays, lists, stacks, recursion Non-linear structure - trees, different types of trees, binary representation of trees. Searching - sequential searches, binary search, hash tables, AVL tables. Sorting- bubble sorts, heap sort, quick sort, bin sort. Graph- describe different types of graph, states the properties of graphs; routes, queued and non-directed, simple algorithm to implement graph.

CSE 326 – OPERATING SYSTEM II (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Review and apply advanced architectural and system-level programming concepts.

2. Understand and implement dynamic procedure activation using stack-based mechanisms.

3. Analyze and use addressing schemes for parameter access and non-local references.

4. Design modular system structures using kernels, abstract data types, and monitors.

5. Evaluate operating system performance using queuing and statistical models.

6. Implement and manage efficient memory systems including virtual memory, paging, and segmentation.

Course Content

This course introduces the major concept area of operating systems principles and teaches the inter-relationship between the operating system and the architecture of computer systems. The following topic are covered:

Review: Instruction sets. I/O and interrupt structure, addressing schemes, microprogramming.

Dynamic Procedure Activation:

Procedure activation and de-activation passing value and reference parameters establishing new local

environments, addressing mechanisms for accessing parameters (e.g. Display, relative addressing in the stack). Implementing non-local references Re-entrant programs, Implementation on register machine.

System Structure:

Design methodologies such as lerel, abstract data types, monitors, Kernels, mulei, Networks of operating systems modules.

Evaluation: Elementary queuing, network modules of system, bottlenecks program behavior, and statistical analysis.

Memory Management:

Characteristics of the hierarchy of storage media, virtual memory, paging, segmentation. Policies and mechanisms for efficiency of mapping operations and multiprogramming, problems of auxiliary memory.

CSE 327 DIGITAL SYTEM DESIGN (2 CREDITS)

Course Learning Outcomes (CLOs)

The key aspects of this course are:

a) To perform the conversion among different number systems

b) Understand Boolean algebra and its basic properties to simplify Boolean functions

c) Optimization of simple logic using Karnaugh maps, and use of "don't care".

d) Familiarization with basic logic gates to demonstrate how to design, build and analyze digital module with combinational (such as Adders, Subtractor, Multiplier, Comparator, Encoders and Decoders, Multiplexers)

e) Understanding of basic sequential logic components: SR Latch, D Flip-Flop and their usage in Synchronous Counters.

f) Learn basics of Shift Registers, PLA, PAL, RAM and Arithmetic-Logic Units (ALUs).

Course Content

Sequential logic Design: Machine class description representation of control Algorithm with state Transution Diagrams (STD) and Algorithms state machine (ASM) charts.

Formal random logic design methodology including the use of map entry variables.

Structured sequential logic design centered around such structured devices as multiplexers, demultiplexers, read only memories (ROMs) and programmable logic arrays (PLAs).

Factors affecting choice of design approach.

Clocks and Timing circuits: Crystal and LC Oscillator circuits. Astable and monostable Timer using IC chips (NE 555, NE 556, 74121, and 74123).
Programmable timers and programmable Timer/Counters, C-MOS timer IC power-up one shot circuits.
Interfacing: Interfacing between different types of logic gates (TTL, C-MOS, ECL, etc). Interfacing between logic gates and optocouplers, phototransistors, photodiodes, switching transistors and light emitting diodes.
Single Converters: Digital-to-Analog (D/A) Converters.
The resistor network current source D/A converters.
The Analog Comparator.
Analog-to-Digital (A/D) converters.
Counter controlled, successive approximation and simultaneous conversion methods.
Digital Readouts: 7-Segment display and display drivers, multiplexed, unmultiplexed displays, keyboards encoders.
Software-based systems:
Introduction to microprocessors and microcomputer.
Implications of the use of software in digital system implementation.

CSE 329: INTRODUCTION TO ROBOTICS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Ability to utilise a systems approach to complex problems and to design an operational performance;
2. Proficiency in engineering design;
3. Capacity for creativity and innovation;
4. Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member; and
5. Ability to apply systems engineering perspective in designing robotic systems.

Course Content

Definition of a Robot, application of robotics. How to teach a robot, robot's working environment. Feedback and Control: Servo Mechanism, the basic parts of a robot. Kinematics: Manipulators, velocity, position transducers, filters used for robots modeling & differential equations. Computer vision & object detection.

EEE 328 – MEASUREMENT AND INSTRUMENTATION (2 CREDITS)

Course Learning Outcomes (CLOs)

1 Analyse the performance characteristics of each instrument

2 Illustrate basic metres such as voltmetres and ammetres

3 Explain about different types of signal analysers

4 Explain the basic features of oscilloscope and different types of oscilloscopes; and

5 Apply the complete knowledge of various electronics instruments/transducers to measure the physical quantities in the field of science, engineering and technology

Course Content

Reliability: Logarithmic Units: Analogue Instrument: Bridges: Ammeters and Voltmeters: Cathode Ray Oscilloscope: Transducers: Signal Sources.

Digital Instrumentation: Digital Counters and timers: frequency and time measurement. Analog to Digital Converters. Digital Voltmeters.

ENG 326 TECHNICAL REPORT WRITING AND PRESENTATION (1 CREDIT)

Course Learning Outcomes (CLOs)

1. State the Principles of effective communication
2. Identify the Professional use of the English Language
3. Explain the Principles of technical writing. Meaning and Types of Research
4. Identify the types of technical report/ Technical Articles. Component parts of a typical project report. Characteristics of an abstract. Importance of Literature Review in a research
5. Know how to choose a project topic
6. Explain Citation and Referencing
7. Carry out Oral presentation of technical ideas (project defence). Tables and figures in a project report

Course Content

Principles of effective communication. Professional use of the English language. Principles of technical writing. Meaning and types of research. Technical reports/ technical articles. Component parts of a technical project reports. Characteristics of an abstract. Importance of literature review in research. How to choose a project topic. Referencing, oral presentation of technical reports in (projects defense). Types of types and figures in a project report.

ENG 418 – COMPUTATIONAL METHODS IN ENGINEERING (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain and solve problems of polynomials and their zeros: methods of bisection, Bairstow synthetic division and lahmer
2. Explain the Divert methods for the solution of linear equations.
3. Solve problems involving Convergence: interpolation and differentiation method in numerical integration
4. Explain and solve problems involving Newton coates formulae and finite difference methods.
5. Explain and solve the eigenvalue problem solution of ordinary differential equations. Methods of Taylor, Euler, Predictor – corrector and range-Kutta

Course Content

Review of classical solutions of various linear and non linear ordinary Integral differential equations and systems. Number systems and error: Representation of integers. Function; Floating point arithmetic; error Propagation. Solution of non-Linear equations; Newton-Raphson's method. Iterative methods, Bairstow's method, Aitken's A2 technique. Matrices and System of linear equation; Gaussian elimination, triangurization methods. Interpolation & Approximation; Differentiation and integration. Solution of Differential equations. Boundary-value Problems in Ordinary Differential Equation.

ENG 400: SIWES (STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME) (15 CREDITS)

Course Learning Outcomes (CLOs)

1.Be exposed and prepared for the Industrial work situation they are likely to meet after graduation, by developing their occupational competencies;

2. 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;

3. 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;

4. 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; and

5. exploit the opportunity to improve and utilize their acquired critical thinking and innate creativity

skills, during the program and SIWES Seminar presentation respectively.

GNT 411: PRACTICUM (2 CREDITS)

Course Learning Outcomes (CLOs)

Produce any product of choice

Course Content

Students are grouped into groups for skill acquisition purposes

CSE 411 STRUCTURED PROGRAMMING (2 CREDITS)

Course Learning Outcomes (CLOs)

Understand the principles of structured programming and its advantages.

2. Apply structured design techniques using sequential, selection, and iteration constructs.
3. Develop modular programs using functions and procedures.
4. Implement programs using arrays, strings, and pointers.
5. Handle input/output operations and file processing.
6. Develop and debug full-scale programs following structured paradigms.

Course Content

The Selection Construct:- IF-THEN, IF-THEN-ELSE, IF-THEN-ELSE-IF.

The Interaction Construct:- FOR-TO-NEXT statement, DO-UNTIL statements DO-WHILE statement, WHILE-WEND, REPEAT-UNTIL, DO-LOOP-WHILE, CASE Construct. Questions that arise when one begins to consider the implications of structured programming. Examples illustrating structured design in various high-level languages. Advantages and disadvantages of structured programming. Pros and Cons of structured programming.

Top-down and Bottom-up design. Differences between top down design and bottom-up design. A comparison of top-and bottom-up programming (design) Pseudo-codes. The use of pseudo codes.

Special service interfaculty common courses:- The following are special service courses to faculties of Education and Management Sciences.

CSE 412 FUNDAMENTALS OF MICROPROCESSOR/ MICROCONTROLLER (2 CREDITS)

Course Learning Outcomes (CLOs)

Develop an ALP in 8085 microprocessor using the internal organization for the given specification;

2. Describe the architecture and functional block of 8051 microcontroller;

3. Develop an embedded C and ALP in 8051 microcontroller using the internal functional blocks for the given specification;

4. Explain various peripheral devices such as 8255, 8279, 8251, 8253, 8259 and 8237; and

5. Explain microcontroller application and basic architecture of PIC, ARM and ATMEGA processors.

Course Content

Definition and basic concepts

Wired versus Micro programmed control Units Wilke's Priginal design.

Parallelism in micro-instructions

Microinstruction address specification

Micro operation timing

Micro Programmed control un-organization minimizing micro instruction size

Micro programmed computer

Application of Microprogramming

CSE 413 LABORATORY PRACTICAL (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand laboratory safety protocols, including general, electrical, and fire safety rules, and demonstrate adherence to precautionary measures in a computing laboratory environment.

2. Identify and utilize standard laboratory working tools necessary for the disassembly and assembly of computer systems.

3. Explain the basic components and structure of a computer system, including different form factors and configurations.

4. Disassemble personal computers and laptops systematically, while identifying and labeling major hardware components such as motherboards, processors, RAM, storage devices, power supplies, cooling systems, ports, connectors, adapter cards, switches, jumpers, and firmware elements.

5. Demonstrate an understanding of Electrostatic Discharge (ESD) and apply proper handling techniques to prevent damage to sensitive components.

6. Assemble computer systems correctly from individual hardware components, ensuring proper installation and connectivity of all internal and external parts.

7. Perform basic system boot-up operations, verify BIOS/firmware settings, and troubleshoot common startup issues.

8. Operate and navigate the Disk Operating System (DOS) using internal and external commands, including the use of wildcards for file management tasks.

9. Demonstrate competence in using the Windows Operating System for file system operations, system settings, and basic administrative tasks.

10 Develop foundational troubleshooting and maintenance skills, enabling diagnosis and resolution of common hardware and operating system issues in personal computer systems.

Course Content

Laboratory Precautionary safety rules. Laboratory working tools. Introduction to Computer System, Identification of Computer form factors. Disassembling of Computer systems, Identification of the various computer components:- ports, connectors, expansion slots, memory slots, firm wares. Assembling of computer systems. Working with Disk Operating System (DOS), using wild cards, internal and external commands. Working with Windows Operating System.

CSE 415 DATA COMMUNICATION (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand the principles of data transmission, including serial and parallel techniques.

2. Describe and analyze asynchronous and synchronous transmission formats.

3. Explain the working of data concentrators and their role in data communication.

4. Apply various error control techniques, including parity and burst error detection.

5.Understand flow control mechanisms such as handshaking and information exchange control.

6. Compare and evaluate different multiplexing techniques and switching schemes.

7. Implement basic routing and queuing procedures in communication networks.

Course Content

Introduction to data communication – parallel and serial transmission techniques. Equalization, Bit sequence transparency.

Data concentrators:- parallel to serial and serial to parallel conversion. Asynchronous and synchronous character formats. Buffered and non buffered concentrators.

Informative flow control:- control by handshaking, information exchange control.

Error control:- the use of parity burst error control. Multiplexing techniques. TDM, Framing and control signaling-Byte multiplexing, multiplexing with address blocks.

Switching systems:- message, circuit and packet switching schemes, routing and Queuing procedures.

CSE 416 COMMERCIAL PROGRAMMING LANGUAGE (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Identify the different types of commercial applications.
2. Understand the power of C# in commercial application development.
3. Write programs using largely the selective and repetitive control statements in C#.
4. Use standard classes and create user-defined classes and objects.
5. Create robust database application using the Microsoft Visual Studio IDE
6. Develop standard console, windows, web, and network applications using the Microsoft C#.
7. Deploy and package applications in the Microsoft Visual Studio IDE.

Course Content

Introduction: concept and classification of programming languages software technologies.

Basic object technology concepts: classes, data members and member functions, history of the UML.

C++ Programming Language; introduction, classes and objects, control statements, functions and recursion, Arrays, Vectors, etc.

Visual Basic: introduction, process steps of VB, the VB environment and workspace, Control in VB, Variables, constants and calculations, decision and conditions.

Lists, Loops and Printing in VB arrays

Web Development: The web application and concept, the HTML-Tags, attributes, etc, Introduction t Dreamweaver, Simple web design projects.

CSE 417 FEEDBACK AND CONTROL – (2 CREDITS)

Course Learning Outcomes (CLOs)

1. State examples of simple control systems;
2. State and explain different stability criteria and compensation methods for linear control systems; and
3. Discuss non-linear control systems and their characteristics.

Course Content

Basic concepts and examples of control systems; feedback, time response analysis, concept of stability, Routh-Hurwitz criterion: Root-locus techniques, frequency response analysis, polar and Bode plots, Nyquist stability Criteria. Nicholas chart. Compensation techniques chart, compensation techniques, introduction to non-linear systems.

CSE 418 DIGITAL COMMUNICATION SYSTEMS II (2 CREDITS)

Course Learning Outcomes (CLOs)

Data Communication Principles:

-Basic data communication concepts.

-Communication channels Error control procedures.

Distributed processing Network:

-Structure of Computer Networks – Star, Ring and Hierarchical networks.

-Decentralized networks

-Physical vs Virtual circuit switching

Course Content

Data Communication Principles:

-Basic data communication concepts.

-Communication channels Error control procedures.

Distributed processing Network:

-Structure of Computer Networks – Star, Ring and Hierarchical networks.

-Decentralized networks

-Physical vs Virtual circuit switching,

-Store and forward techniques

-Message and packet switching network modes and interface processors.

-Routine control

Computer Network Protocols:

-Data transmission

-RS-232 and X.21 standards.

-Rand with allocation and standards.

-Polling and Centention

-Error control

-Network and host protocols-protocol requirement

-Protocol distribution, calling/ink, control/data exchange

-Network flow, protocol standards and networks HLDC, the interactional V.25 standard, IBM SNA DECNET, Review of local area networks Arpanet, Tymnet, telenet and euronet network security considerations.

CSE 510 COMPUTER MODELLING AND SIMULATION (2 CREDITS)

Course Content

Basics of Modelling and Simulation, Random Numbers, Random Number Generation, Monte Carlo Method, Statistical Distribution Functions, Common Probability Distributions.

CSE 511 SOLID STATE ELECTRONICS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand the physical properties and characteristics of semiconductor materials.
2. Explain the operation of diodes, BJTs, FETs, and other solid-state devices.
3. Analyze and design basic solid-state electronic circuits.
4. Understand the behavior of PN junctions under different bias conditions.
5. Explore applications of solid-state electronics in modern computing systems.
6. Evaluate the limitations and performance characteristics of solid-state components.

Course Content

Physics and property of semi-conductors, indicating high field effect carrier injectors and semi-conductor surface phenomena. Device technology, bulk and epitaxial material growth and impurity control, metal-semi-conductor interface properties. Stability and methods of characterization controlled and surface - controlled devices

CSE 512 – COMPUTER ARCHITECTURE (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Describe the fundamental design techniques of a computer system;
2. Explain the functional units of a processor;
3. Explain addressing modes, instruction formats, and Programme control statements;
4. Identify the organization of various parts of a system memory hierarchy;

5. Describe the basic concept of parallel computing; and

6. Describe fundamentals concepts of pipeline and vector processing.

Course Content

Introduction to design techniques and synthesis of digital computers, ALU CONTROL, CPU, I/O DEVICES and CO-PROCESSORS. Principles of computer structure and design as applied to major computer component functions. Bus architecture, plug and play systems. Duplex, double 8888 module and single non module. Design, methodology, processor and CPU design, memory organization; input-output communication and multiple CPU systems.

CSE 513 – COMPUTER ENGINEERING LAW AND MANAGEMENT (2 CREDITS)

Course Learning Outcomes (CLOs)

1. The nature, scope and influence of managerial roles, skills, ethics and decision-making, supporting effective project work, change management, appraisal methods, and evaluation
2. Manufacturing, projects and systems management, operations management and quality management
3. Activity based costing, budgeting, financial control, investment appraisal, and calculations of commercial risks
4. Legal systems relevant for engineering: contract law, intellectual property and tort, both nationally and internationally
5. Professional bodies, codes of conduct, conflicts of interest and other ethical glitches

Course Content

Engineering Ethics: Introduction to Computer ethics, computer crime, intellectual property, professional responsibility.

Computer forensic and law: Introduction to computer forensic application processes, forensic tools used for investigations, legal aspect, data protection, copyright, public interest, disclosure, Sarbanes, oxley.

Audit and security: Audit process, audit methos, audit framework, professional qualifications.

Organizational development: Understanding organizational development as a process; preparation and monitoring of a development plan, recognizing the balance between macro and micro-organizational development.

Risk Management and driving change: Identification and formulation of corporate strategies, risk management and plan for uncertainty, the management of a change process

Successful management skills for middle managers: understanding functional process mapping, organization of workflow and delegation, incorporation of decision making and optimization of quality through value analysis.

Managing the Training and Development functions: preparation of strategies for talent management, preparation and conduct performance appraisal, evaluation of return on investment from training.

CSE 514 DIGITAL COMMUNICATION SYSTEMS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand the structure and components of communication systems.
2. Analyze different modulation schemes including amplitude, angle, and pulse modulation.
3. Understand the impact of noise and propagation effects on telecommunication systems.
4. Describe the function and characteristics of antennas, transmitters, and receivers.
5. Evaluate modern wireless communication technologies and multichannel systems.
6. Apply information theory concepts such as entropy and Shannon's capacity in system design.

Course Content

Data Communication Principles: Basic data communication concepts. Communication channels Error control procedures.

Distributed processing Network: Structure of Computer Networks – Star, Ring and Hierarchical networks. Decentralized networks. Physical vs Virtual circuit switching, Store and forward techniques. Message and packet switching network modes and interface processors. Routine control

Computer Network Protocols: Data transmission. RS-232 and X.21 standards. Rand with allocation and standards. Polling and Centention. Error control. Network and host protocols-protocol requirement. Protocol distribution, calling/ink, control/data exchange. Network flow, protocol standards and networks HLDC, the interactional V.25 standard, IBM SNA DECNET, Review of local area networks Arpanet, Tymnet, telenet and euronet network security considerations.

CSE 515 – REAL TIME COMPUTING AND CONTROL (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Describe open and closed-loop systems
2. Explain and model linear systems in state space
3. Design lead and Lag compensations
4. Use Mason’s Gain rule to compute transfer function for a signal flow graph
5. Apply MATLAB/SIMULINK to solve control system problems

6. Distinguish between controllability and Observability of a system

Course Content

Real-time control concepts:- Open and closed loop control, Feedback sensors and feedback signal conditioning controlling position, Speed and Acceleration in real-time. Remote control techniques. Optical isolation and touchstone techniques. Multiplexed, Open loop control of several devices in real-time. Interrupt-driven real-time events and physical systems. Emphasis is on control of physical devices requiring varying degrees of real-time interactions. Typical projects, include microcomputer-based motor control (stepper motors, DC motors and AC motors), traffic light control software based real time signal, function connection system monitoring and control. Operating system environment, the linking of machine code and assembly language with high-level language programs for over-coming time constraints. Use of dynamic data structure in interactive environments.

Multiprocessor system:- Inter-processor Communication strategies. IEEE-488. general purpose interface bus (GPIS). The S-100 Bus standard. Use of memory communication. Control Computer systems: Characteristics of control computers. Performance evaluation.

CSE 516 – ARTIFICIAL INTELLIGENCE (2 CREDITS)

Course Learning Outcomes (CLOs)

1. State the definition of Artificial Intelligence
2. List the different faculties involved with intelligent behavior
3. Explain what an agent is and how it interacts with the environment and Identify the percepts available to the agent and the actions that the agent can execute, if given a problem situation
4. Identify the characteristics of the environment and describe the state space representation.
5. Describe some algorithms Formulate, when given a problem description, the terms of a state space search problem
6. Analyze a given problem and identify the most suitable search strategy for the problem.
7. Describe a Game tree
8. Explain Intelligent Backtracking and the meaning of Knowledge Representation
9. Discuss the similarities between Lisp and Prolog Programming

Course Content

Fundamental concept of AI, Goals of AI, AI approaches, AI techniques, Branches of AI, Applications of AI, Search Algorithms, Knowledge representation, Reasoning systems, Game playing in AI, Learning Systems in AI, Expert systems, Fuzzy set theory, Fundamental of Neural networks, Fundamentals of Genetic Algorithm, Natural Language processing, Common Sense.

CSE 517 OPERATIONAL RESEARCH (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Mathematical Programming (Linear Programming)
2. The Transportation Model and Assignment Model
3. Project Management
4. Elements of Decision Analysis and Approaches to Decision Analysis and Types of Decision Situations
5. Decision Trees and Operations Research (OR)
6. Modelling in Operations Research
7. Simulation and Systems Analysis
8. Sequencing and Games Theory
9. Inventory Control
10. Case for OR Analysis
11 Integer Programming

12 Indefinite Integra

Course Content

Linear programming, Application to product mix, resource allocation and transportation. Deterministic inventory control. Critical path analysis, Probabilistic inventory problems and maintenance, decision-making criteria and decision trees. Technological forecasting, Dynamic programming, Computer aided management, group and individual programming exercise.

CSE 518 – SOFTWARE PROJECT MANAGEMENT (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand the life cycle and components of a software project.
2. Estimate time, cost, and resources for software development.
3. Plan and schedule software project tasks effectively.
4. Apply risk analysis and management strategies.

5. Implement quality assurance and performance monitoring.
6. Use tools for software project tracking, documentation, and communication.
7. Apply professional and ethical practices in software project leadership.

Course Content

Defining System Requirement:- requirement analysis, software support requirements, developing the systems specifications.

Project Cost, Schedule And Controls:- Estimating project cost and schedule, project control and configuration management (using appropriate control mechanisms, PERT and GANTT charts, Detecting and controlling deviations from specifications and schedule).

The Design Phase:- Reliability and portability considerations, Coordinating software and hardware design, Guides for designing testable and maintainable systems, Techniques for system software design, designing and integrated tests plan, design reviews, documentation formats and procedures.

The Implementation Phase:- Structured programming module by module and Top-Down programming practicals, effective use of software development aids, software subsystem debugging. Software/hardware integration and testing.

The Product Support/Maintenance Phase:- Comprehensive system diagnostic well designed user-documentation. Minimizing the cost of software updates, pres designing software for flexibility.

Performance Evaluation:- Data analysis, Event/time driver data collection. Logging function, data reduction. Software monitors, Sigma, detection, counting and timing, plug board Logic, advanced feature, commercial monitors.

Performance Evaluation Project Methodology:-

Environment identification, problem definition, formation of project plan. Data collection and summarization. Data analysis and interpretation, Documentation of findings.

CSE 519 SEMINAR (1 CREDIT)

Course Learning Outcomes (CLOs)

1. Demonstrate effective communication skills through oral presentations and written reports on selected topics.
2. Critically evaluate scholarly literature and current developments related to the seminar theme or research area.
3. Formulate and articulate research questions or discussion points relevant to the seminar topic.
4. Engage in informed discussions by listening actively, asking relevant questions, and providing

constructive feedback to peers.

5. Apply interdisciplinary approaches or theoretical frameworks to analyze issues presented during the seminar sessions.
6. Plan and deliver a structured seminar presentation, utilizing appropriate visual aids and time management strategies.
7. Reflect on personal learning and development gained through seminar participation and peer interaction.
8. Exhibit professionalism and ethical responsibility in academic discourse and collaboration.

CSE 520 -COMPUTER GRAPHICS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Explain the basics of computer graphics.
2. Interpret essential mathematics in computer graphics.
3. Apply mathematics to graphics systems.
4. Implement common data structures to represent and manipulate geometry.
5. Demonstrate common approaches to model light and materials.
6. Apply basic shading techniques.
7. Apply basic image-processing techniques.
8. Explain how the human visual system plays a role in interpretation of graphics.
9. Perform color and light representation and manipulation in graphics systems

Course Content

Review of the Cathode Ray Tube (CRT) and point plotting displays, Computer control of pointing displays, Vector generation-dots, Lines, Linestrenght estimate. Digital and Analog methods.
Display Processors:- Controlling a vector – drawing display, channels and display processors, character generators.
Display File Compilers:- Display code generation, Graphical function. The viewing algorithm, segmented display files, free storage allocations display subroutines: Graphical data structures.
2-Dimentional transformations:- the need for transformation, concatenation, matrix representations.
Clipping And Windowing: Clipping, view ports, windows and instances.
Transformation System: Adding transformation to the display compiler. The transformation of sub-pictures, pseudo display files, transformed display, File compilation, sequencing of transformations, display procedures, practical programming exercises to test under standing of the subject matter.

CSE 521 DIGITAL COMPUTER NETW0RK (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Identify the different types of computer networks and understand the components of a network.
2. Explain the different types of network topologies and describe the advantages and disadvantages of each.
3. Explain the role of network protocols and the differences between TCP/IP and UDP.
4. Discuss the purpose of IP addressing, the difference between IPv4 and IPv6 addressing, and the concept of subnetting and supernetting.
5. Identify the role of routing in computer networks, the different types of routing algorithms, and the routing protocols used in computer networks.
6. Explain the importance of network security, firewalls' role, and encryption's importance in computer networks.
7. Clarify the role of network services, the importance of DNS and DHCP, and how they are used in computer networks.
8. Simplify the purpose of WANs, the different types of WANs, and the different WAN technologies used in computer networks.
9. Explain the basics of wireless networks, the different types of wireless networks, and the importance of wireless security.
10. Clarify the importance of network management, the role of network monitoring and troubleshooting, and the steps to optimize network performance.

Course Content

Data Communication Principles: Basic data communication concepts, communication channels, Error control procedures.

Distributed Processing Network: Structure of computer networks – Star, Ring and Hierarchical networks. Decentralized networks, physical vs Virtual circuit switching, store and forward techniques. Message and packet switching network modes and interface processors, Routine control.

Computer Network Protocols: Data transmission, RS-232 and X-21 standards. Bandwidth allocation and standards. Polling and contention. Error control, network and host protocols- protocol requirement, protocol distribution, calling/link, control/data exchange. Network flow, protocol standards and network – HLDC, the international X.25 standards, IBM, SNA, DECENT, Review of local area networks, Arpanet, tymnet, telnet, and Euro net network security considerations.

CSE 522 ADVANCED SYSTEMS PROGRAMMING (2 CREDITS)

Cou 1. Compare Java and C/C++ in memory management and performance.

2. Install and configure Java development tools.

3. Understand how to create a Java program.

4. Declare and initialize variables.

5. Manipulate data using the different operators in Java.

6. Make use of the basic input, output, and other standard classes in Java.

7. Write codes using the program control statements.

8. Use arrays efficiently in programming.

9. Understand the concepts of object-oriented programming.

10. Write and debug codes efficiently.

rse Learning Outcomes (CLOs)

Course Content

Pre-requisite 322

Factors to be considered in the design of a range of components.

-Instruction format

-Addressing schemes

-Operating system requirements.

Design of large fast components.

Control Process Design.

-arithmetic Unit design, registers, buses, clocks, memory parts and packaging of the processor.

-Microcomputer architecture and instruction sets, building block approach to micro system design.

-Introduction to Binomial theorem, partial fractions, the argand diagram Derivation theorem, root of unity.

Circular measure, trigonometric functions of angles, addition and factor formular.

Graph of sin trigometric identities, double angle and half angle formulars. The equation of a circle and length of a sector small angle.

Graphical data communication and distributed programming, prior detection.

CSE 523 INSTRUMENTATION ENGINEERING (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Apply the concepts of automatic control, including measurement, feedback and feed forward regulation for the operation of continuous and discrete systems.

2. Design and implement systems utilizing analog/digital control devices.

3. Apply the concepts of chemistry, physics & electric/electronics to measurement & control systems.
4. Apply the concepts of digital and microprocessor systems and functionality of system components/devices for the automation of processes.
5. Apply the concepts of measurements and sensor selection.
6. Communicate the technical details of control systems using current techniques and graphical standards.
7. Apply the concepts of mechanics, fluid mechanics, and heat transfer to the design of process control systems.
8. Understand and utilize programmable logic controllers (PLC), distributed control systems (DCS) and supervisory control systems for control of manufacturing and processing systems.
9. Demonstrate proficiency in the utilization of differential and integral calculus and ordinary differential equations in the design, analysis, and performance assessment of control systems.
10. Demonstrate the ability to utilize modern and effective management skills for performing investigation, analysis, and synthesis in the implementation of automatic control systems.

Course Content

Course work and laboratory secessional emphasizing the design of instruments for measuring and controlling industrial processes.

The scope of each topic includes micro computer controlled measurements.

Thermal systems: thermo resistive sensing elements, Display arrangements for thermo resistive instruments, thermo coupled indicators and their use in sillivolt pyrometers

Level determining system: Float and liquid displaced level sensors. Level determination by means of electrical conductivity of liquids. Radiation, ultrasonic, pressure-sensitive and weight level determination techniques. Load-cell and photo-electric level control systems. Automate liquid level control.

Pressure systems: pressure bases, industrial hydraulic and pneumatic systems. State and steam pressure systems, pressure system components.

Flow process systems: Flow process equipment, Flow meters (head, magnetic, velocity, positive displacements, and ultrasonic types.).

Relative advantages of various types of flow meters in liquid and gas measurements.

CSE 524 ADVANCED COMPILER WRITING TECHNIQUES (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Design and implement advanced compiler features and optimizations.
2. Apply sophisticated parsing techniques to handle complex programming languages.
3. Optimize code generation and improve runtime performance.
4. Understand and implement advanced register allocation strategies.
5. Analyze and compare modern compiler architectures and their optimization techniques

Course Content

Operator precedence, higher order proceeds Bounded context transition matrices.
The language, using PL, calling semantic routines case studies.
Error Recover:- Recovery from semantic errors, Recovery from syntactic errors.
Code Generation:- Generation code for simple arithmetic expressions, Addressing operands, Extending code generation to other quadruple types. Compacting code generation, object modules.
Code Optimization, more effective optimization, case studies.
Translator Writing System: Introduction, a look at the compilers.

CSE 525 -COMPUTER INSTALLATION AND MAINTENANCE (3 CREDITS)

Course Learning Outcomes (CLOs)

1. Identify and manage space and environmental requirements for installing computer equipment.
2. Understand power supply requirements and apply protective techniques such as UPS and vibration control.
3. Perform start-up checks and use diagnostic tools in maintaining computer systems.
4. Disassemble, repair, and reassemble various computer peripherals and interface devices.
5. Install and maintain computer systems from micro to mainframe.
6. Apply preventive maintenance methods and troubleshoot hardware-related issues.
7. Analyze interconnection diagrams and locate errors within complex systems.
8. Identify sources of noise, magnetism, and static discharge and implement control measures.

Course Content

Space requirement and service clearances, Temperature, dust and humility control techniques,. Factors affecting sitting and installation of Computer equipments, Power supply requirement (single phase, three phase, etc.) Uninterruptible power supplies and applications, False Flooring, Cable trenching, Elimination of floor vibration in Computer rooms. Preliminary checks prior to start –up of an inactive computer systems, Start-up procedures. Use of maintenance aids in a computer environment. Aims and uses of tolerance levels

to ascertain specifications.

Disassembling, repairing, and re-assembling of peripherals and interfaces: card readers, card punches, tape drivers, line printers, graph plotters, disk drives, terminals and work stations. Servicing of video display unite, modems and teleprinters. Interconnecting sketches and diagrams to depict the way the units of a computer systems are to be assembled. Installation procedures for mainframes, minis and micros.

Preventive maintenance Techniques:- identification and elimination of noise, digital hardware, Routine power line checks. Corrosion prevention and correction of computer systems. Identification and elimination of stray magnetism and static discharge in a computer environment.

Identification of error source and location of computer components and chips in PCs and mainframes.

CSE 527 DIGITAL SIGNAL PROCESSING (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Understand analytical tools such as fourier transforms, discrete fourier transforms, fast Fourier transforms and Z-transforms required for digital signal processing;

2. Get familiarized with various structures of IIR and FIR systems;

3. Design and realise various digital filters for digital signal processing; and

4. Understand the applications of DSP in speech processing and spectrum analysis.

Course Content

The objective of this course is to develop an in-depth understanding of modern methods of digital signal processing and to highlight the application areas.

Review of time and frequency domains, compiling, bandwidth and aliasing. Convolution and linear systems, recursive and non-recursive difference equations, the transform, and inverse-transform. Discrete Fourier transform practical uses and examples, fast Fourier transform algorithms in digital filter implementations. Detailed application case study-problem definition selection of filter type selection of methodology, detailed design of signal processor, hardware/software implementation. Overview of application area. Telecommunications, radar and solar processing vibration and acoustic analysis, biomedical analysis-EKG, EEG and acoustic emerging.

CSE 500 FINAL YEAR PROJECT (6 CREDITS)

Course Learning Outcomes (CLOs)

1. Select a relevant project topic from areas of computer Engineering

2. Develop a comprehensive research methodology and project plan under academic supervision.

3. Integrate multidisciplinary engineering knowledge to address complex real-world problems.

4. Execute the project through experimental, analytical, or computational methods.

5. Prepare a detailed technical report that documents methodologies, findings, and conclusions.

6. Defend the project outcomes in an oral examination before an External Examiner and the Departmental Board of Examiners.

Course Content

This course lasts for one academic session. Each student must undertake a project under the supervision of a lecturer. Submit a comprehensive project report and present a seminar at the end of the year. Sa project status report is to be presented at the end of the first semester. Each student must attend Engineering seminars.

ELECTIVES

CSE 528 ASSEMBLER/TRANSLATOR/COMPILER CONSTRUCTION (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Background to ANN and Parallel and Distributed Processing (PDP) models;

2. Basics of ANN including terminology, topology and learning laws

3. Analysis of Feedforward Neural Networks (FFNN) including linear associative networks, perceptron network, multilayer perceptron, gradient descent methods and backpropagation learning

4. Analysis of Feedback Neural Networks (FBNN) including Hopfield model, state transition diagram, stochastic networks, Boltzmann learning law

5. Evolution of ANN architectures - from learning to deep learning

Course Content

The assembly process: Forward reference one pass and two pass assembler, assembly location counter, symbols table, pass one of 2-pass assembler, software implementation, pass of 2-pass assembler, use of reverse poloh notation in assembler software. Application of searching, sorting and hashing techniques in assembler software. Macro definition, call and expansion, macros with parameters, conditional macro expansion, nested macro calls, recursive macro calls, nested macro definitions, implementation of a macro

facility in an assembler software details, linking and loading. Introduction to translator writing, grammars and languages. The scanner programming a scanner, a constructor for compiler scanners, The AED and RWORD system.

CSE 526 NEURAL NETWORKS (2 CREDITS)

Course Learning Outcomes (CLOs)

1. Background to ANN and Parallel and Distributed Processing (PDP) models;

2. Basics of ANN including terminology, topology and learning laws

3. Analysis of Feedforward Neural Networks (FFNN) including linear associative networks, perceptron network, multilayer perceptron, gradient descent methods and backpropagation learning

4. Analysis of Feedback Neural Networks (FBNN) including Hopfield model, state transition diagram, stochastic networks, Boltzmann learning law

5. Evolution of ANN architectures - from learning to deep learning

Course Content

Introduction: Basic concepts definitions, overview of neural networks. Comparism of Biological neurons and Artificial Neural Networks. Basic structures and building models of Artificial Neural Neural Networks, Limitations and challenges, Pattern recognition, clustering/ categorization function approximation, Basic problems, prediction/ forecasting, network architectures. Supervised and unsupervised learning process, training the Artificial Neural Network system.

SECTION 6

STAFF

The academic staff of the department are listed in Table 6.1.

Table 6.1: List of Academic Staff of the Department

S/N	Name of Staff	Rank	Specialization
1	Engr Dr NNOCHIRI Ifeoma U.	Associate Professor	Computer Engr.
2	Engr. Prof. Ihekweaba Gozie	Professor	Computer Engr.
3	Engr. Prof, L. I. Oborkhale	Professor	Telecom. Engr.
4	Engr. Prof. P.I. Obi	Professor	Elect. Engr.
5	Engr. Prof. I. O. Okoro	Professor	Elect. Engr.
6	Engr.Dr ARU OKEREKE EZE	Associate Professor	Computer Engr.
7	Engr. Dr. E. U. Udo.	Associate Professor	Electronic Engr.
8	Engr Dr T. T. CHIAGUNYE	Associate Professor	Computer Engr.
9	Engr Dr ILO, SOMTOOCHUKWU FRANCIS	Senior Lecturer	Computer Engr.
10	Engr Dr. H. U. UDEANI	Senior Lecturer	Computer Engr.
11	Engr Dr. Ezeh Chinenye Matthew-Emmanuel	Senior Lecturer	Computer Engr.
12	Engr. Dr. C. A. Akwuroha	Senior Lecturer	Telecom. Engr.
13	Engr. Nwachukwu-Nwokeafor Kenneth C.	Lecturer 1	Computer Engr.
14	Engr. AGUODOH PATRICK CHIBUZOR	Lecturer 1	Computer Engr.
15	ENGR. C. C. EDE	Lecturer 1	Computer Engr.
16	Engr. Dr. Amadi Christopher Chidi	Lecturer 1	Computer Engr.
17	Ngwu Chinyere Rosemary	Lecturer 1	Computer Engr.
18	Adimorah Kyrian Chinemeze	Lecturer 11	Computer Engr.
19	Ogenyi Uchenna Emeoha	Lecturer 11	Computer Engr.
20	Cosmos Nnanyerem Umesi	Lecturer 11	Computer Engr.
21	OlehUgonna Queen	Lecturer 11	Computer Engr.
22	Okey Danel Ogobuchi	GA	Computer Engr.
23	Ajaero Emmaneul	GA	Computer Engr.
24	Attah Samuel Uchechukwu	GA	Computer Engr.