

BABCOCK UNIVERSITY
SCHOOL OF ENGINEERING
UNDERGRADUATE BULLETIN

WELCOME TO THE SCHOOL OF ENGINEERING



Engr. Prof. Ezekiel Adelere Adeniran, Ph.D., FNSE, FNIEE, R.COREN.
Dean, School of Engineering

I welcome you to Babcock University School of Engineering (BUSE). As of now, the School has four departments: Civil Engineering, Computer Engineering, Electrical and Electronic Engineering, and Mechanical Engineering.

The Department of Civil Engineering offers a programme in Civil Engineering with specializations in Structural Engineering, Water Resources and Environmental Engineering, Highway and Transportation Engineering, and Geochemical/Foundation Engineering. The Department of Computer Engineering runs a programme to produce competent computer engineering graduates who are well groomed in interdisciplinary engineering knowledge with specializations in Artificial Intelligence, Computer Architecture, Computer Design and Engineering, Robotics and Automation Engineering, Hardware and Software Engineering, Cyberpreneurship and Cyberlaw. The Department of Electrical and Electronics Engineering have areas of specialization covering Computer Hardware and Software Design, Control and Instrumentation, Communication Electronics, Electrical Power and Machines, and Systems Analysis. The Department of Mechanical Engineering runs a programme in Mechanical Engineering with options in Solid Mechanic/Mechatronics Engineering, Design and Production Engineering, and Thermo-fluids/Computational Fluid Dynamics.

The School of Engineering operates in tandem with the vision of Babcock University to train God-fearing servant leaders. We aim to produce engineers with adequate knowledge and rigor to solve the problems of the 21st century while maintaining high moral integrity.

The school has a cream of qualified, versatile, and widely cited academics, ranging from professors, senior academic staff, and well-trained technologists. The non-teaching teams are also available to work in hand with the academic staff in the school to provide the much-needed hands-on laboratory and workshop experience. The school buildings are top-class, purpose-built and provide facilities and a congenial environment for teaching, learning, and research. Our laboratories and workshops are equipped with state-of-the-art equipment for the training of 21st-century engineers and cutting-edge research.

Babcock University School of Engineering is committed to producing self-reliant, self-motivated, dependable, and versatile Engineering graduates through sound Engineering research, education, and training. The programmes are fully accredited by the National Universities Commission (NUC), the International Board of Education (IBE), and the Adventist Accreditation Association (AAA).

Welcome to Babcock School of Engineering, where Diligence, Excellence, Integrity, and Devotion are in harmony.

Engr. Prof. Ezekiel Adelere Adeniran.
Dean, School of Engineering

DEPARTMENT OF CIVIL ENGINEERING



Engr. Dr. Adeyemi Oluwaseun ADEBOJE
Head of Department

BACHELOR OF CIVIL ENGINEERING (B.ENG.)

Philosophy

The Civil Engineering discipline makes elaborate attempts to ensure that a structure meets its specifications and other requirements prior to its actual construction and the methods employed are Analysis and Design. The design is a purposeful activity directed toward the goal of fulfilling human needs, particularly those which can be met by the techno- logical factors of our culture. The department has its primary function to educate and train the students to have the technical competence for the design development, testing and production of devices, systems, and products that are of benefit to mankind. “Who builds his upper chambers in the heavens and founds his vault upon the earth; who calls for the waters of the sea and pours them out upon the surface of the earth-the Lord is his name.” Amos 9:6. God is a MASTER ENGINEER, who is a creator of time and space. He designed and created the earth and He gives all engineers a mind to learn from His works of creation, to gain knowledge necessary to engineer a better world on this earth. Tubal Cain was the first human engineer who forged out all kinds of tools from Iron and bronze.

Objectives

- i. To equip students with good knowledge of all the various branches of civil engineering with further specialization
- ii. To produce resourceful graduates who are innovative and can practice with little or no supervision in relative/specialized fields like construction engineering, structural engineering, environmental engineering, geotechnical/geodetics engineering. Surveying, transportation engineering and lots more.
- iii. To provide students with necessary tools with science and technological background and polish them in specific area of civil engineering in the graduating year.
- iv. Practice Civil Engineering with an awareness of and commitment to ethics and social responsibility, sustainability and diversify both as individual and as in a team.
- v. To equip students with necessary workshop practices for the technological know-how.

VISION STATEMENT

To produce Civil Engineers of high caliber, technical skills and ethical values to serve the society and nation and to be the best Civil Engineering Department nationwide.

MISSION STATEMENT

The mission of the department is to produce Civil Engineer who are knowledgeable and motivated to practice in the profession with integrity and strive for excellence.

ADMISSION REQUIREMENTS

Candidates are admitted into the degree programme in any 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 a five-year degree programme, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes, provided they have satisfied all the following conditions –

- a. A minimum of Credit level (C6) pass in at least 5 subjects, including English Language; Mathematics, Physics, Chemistry and any other acceptable science subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.

It is also desirable for candidates to have Further Mathematics and Technical Drawing at credit levels. This will be an added advantage.

- b. Acceptable score in the Unified Tertiary Matriculation Examinations (UTME). The subjects are Mathematics, Physics, Chemistry, and English Language.
- c. In addition, candidates with acceptable Unified Tertiary Matriculations Examinations (UTME) results will further be screened to ascertain suitability for admission into Babcock University.

Direct Entry Mode

For four year Direct Entry, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy the following three conditions –

- a. Candidates must satisfy the 5 credits ‘O’ Level requirements in English Language; Mathematics, Physics, Chemistry and any other one relevant subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.
- b. 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 through Direct Entry. Candidates who have good National Diploma (ND) result, minimum of Upper Credit in

relevant Engineering Technology programmes from recognized institution may also be considered for admission into 200 level.

- c. Direct entry candidates must also satisfy the UTME requirements.

COURSE DURATION

This undergraduate programme will run for 10 semesters (5 academic sessions) for full time and 8 semesters (4 academic sessions) for Direct Entry students.

GRADUATION REQUIREMENTS

The following regulations shall govern the conditions for the award of a honours degree in Engineering and Technology:

1. candidates admitted through the UTME mode shall have registered for a minimum of 150 and maximum of 180 units of courses during the 5-year engineering degree programme. Such candidates shall have spent a minimum of ten academic semesters;
2. candidates admitted through the Direct Entry mode shall have registered for a minimum of 120 and a maximum of 150 units of courses during a 4-year engineering degree programme. Such candidates shall have spent a minimum of eight academic semesters;
3. candidates admitted through the Direct Entry mode at 300-Level shall have registered for a minimum of 90 and a maximum of 120 units of courses during a 3-year engineering degree programme. Such candidates shall have spent a minimum of 6 academic semesters;
4. The minimum and maximum credit load per semester is 16 and 24 credit units respectively; a student shall have completed and passed all the Courses registered for, including all compulsory courses and such elective /optional courses as may be specified by the university/faculty or department; obtained a minimum Cumulative Grade Point Average (CGPA) specified by the university but not less than 2.00; and
5. a student shall also have earned the 11 credit units of Students Industrial Work Experience Scheme (SIWES), 8 credit units of University General Study courses and four credit units of Entrepreneurship courses.

GLOBAL COURSE STRUCTURE

LEVEL	GST/ENT	Basic Science	Discipline/GET	Programme (CEE)	SIWES	Total
100	11	25	3	2	-	41
200	11	-	29	4	3	47
300	9	-	18	16	4	47
400	4	-	10	18	4	36
500	4	-	5	24	-	33
TOTAL	39	25	65	64	11	204

COURSE CODE	SEMESTER		TOTAL CREDITS
	1 ST	2 ND	
100 LEVEL	20	21	41Credits
200 LEVEL	24	23	47 Credits
300 LEVEL	23	24	47Credits
400 LEVEL	18	18	36 Credits
500 LEVEL	16	17	33 Credits
TOTAL	101	103	204 Credits

BACHELOR OF CIVIL ENGINEERING (B.ENG.)**100 LEVEL COURSES**

COURSE CODE	COURSE TITLE	STATUS Core/ Elective	SEMESTER	
			1ST	2ND
GST 001.002	Citizenship Orientation	C	0	0
GST 111	Communication in English	C	2	-
GST 112	Nigerian Peoples and Culture	C	-	2
BU – GST 105	Use of Library and Study Skills	C	2	-
BU – GST 112	Health Principles	C	-	1
BU – GST 120	ICT Fundamentals and Office Productivity Management	C	1	-
BU – GST 126	Life and Teachings of Christ the Messiah	C	-	3
CHM 101	General Chemistry I	C	2	-
CHM 102	General Chemistry II	C	-	2
CHM 107	General Practical Chemistry I	C	1	-
CHM 108	General Practical Chemistry II	C	-	1
MTH 101	Elementary Mathematics I	C	2	-
MTH 102	Elementary Mathematics II	C	-	2
MTH 103	Elementary Mathematics III	C	2	-
PHY 101	General Physics I	C	2	-
PHY 102	General Physics II	C	-	2
PHY 103	General Physics III	C	2	-
PHY 104	General Physics IV	C	-	2
PHY 107	General Practical Physics I	C	1	-
PHY 108	General Practical Physics II	C	-	1
STA 112	Introduction to Statistics and Probability	C	-	3
GET 101	Engineer in Society	C	1	-
GET 102	Engineering Graphics and Solid Modelling I	C	-	2
CEE101	Introduction to Civil Engineering	C	2	-
	TOTAL (41 Credits)		20	21

BACHELOR OF CIVIL ENGINEERING (B.ENG.)**200 LEVEL COURSES**

COURSE CODE	COURSE TITLE	STATUS Core/ Elective	SEMESTER	
			1ST	2ND
GST 001.002	Citizenship Orientation	C	0	0
ENT 211	Entrepreneurship and Innovation	C	2	-
GST 212	Philosophy, Logic and Human Existence	C	-	2
BU – GST 200	Communication in French	C	-	1
BU – GST 215	Adventist Heritage	C	3	-
BU – GST 220	Origin of Science	C	-	1
BU – GST 221	Introduction to Agriculture	C	1	-
BU – GST 290	Introduction to Data Analytics	C	1	-
GET 201	Applied Electricity I	C	3	-
GET 202	Engineering Materials	C	-	3
GET 204	Student Workshop Practice	C	-	2
GET 205	Fundamentals of Fluid Mechanics	C	3	-
GET 206	Fundamentals of Thermodynamics	C	-	3
GET 207	Applied Mechanics	C	3	-
GET 208	Strength of Materials	C	-	3
GET 209	Engineering Mathematics I	C	3	-
GET 210	Engineering Mathematics II	C	-	3
GET 211	Computing and Software Engineering	C	3	-
CEE 201	Civil Engineering Drawing	C	2	-
BU-CEE 202	Elements of Architecture	C	-	2
*GET 290	SIWES I: Students Industrial Work Experience	C	-	3
	TOTAL (47 Credits)		24	23

NOTE:

*GET 290 – Student Work Experience Scheme – 9 Weeks

BACHELOR OF CIVIL ENGINEERING (B.ENG.)

300 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/ Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
ENT 312	Venture Creation	C	-	2
GST 312	Peace and Conflict Resolution	C	-	2
BU – GST 310	Data Analysis Using Advanced Excel / SPSS / POWER BI / TABLEAU	C	1	-
BU – GST 312	Family Life	C	-	1
BU – GST 317	Fundamentals of Christian Faith	C	3	-
GET 301	Engineering Mathematics III	C	3	-
GET 302	Engineering Mathematics IV	C	-	3
GET 304	Engineering Communication, Technical Writing and Presentation	C	-	3
GET 305	Engineering Statistics and Data Analytics	C	3	-
GET 306	Renewable Energy System and Technology	C	-	3
GET 307	Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies	C	3	-
CEE 301	Fluid Mechanics	C	3	-
CEE 302	Strength of Structural Materials	C	-	2
CEE 303	Engineering Geology	C	2	-
CEE 305	Soil Mechanics 1	C	3	-
CEE 306	Design of Structures I	C	-	2
CEE 307	Structural Mechanics I	C	2	-
CEE 308	Engineering Surveying and Photogrammetry I	C	-	2
*GET 390	SIWES II: Students Industrial Work Experience	C	-	4
	TOTAL (47 Credits)		23	24

NOTE:

*GET 390 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF CIVIL ENGINEERING (B.ENG.)

400 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/ Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 400	Religion and Social Ethics	C	3	-
BU – GST 440	E-Project Management and Simulation	C	1	-
GET 402	Engineering Project I	C	-	2
GET 404	Engineering Valuation and Costing	C	-	2
CEE 404	Civil Engineering Materials	C	-	3
CEE 406	Engineering Surveying and Photogrammetry II	C	2	-
BU-CEE 401	Transportation Engineering	C	3	-
BU-CEE 403	Hydraulics	C	2	-
BU-CEE 405	Hydrology	C	2	
BU-CEE 409	Soil Mechanics II	C	2	-
BU-CEE 406	Design of Structures II	C	-	2
BU-CEE 407	Structural Mechanics II	C	2	-
BU-CEE 408	Water & Waste Water Management	C	-	2
BU- GEG 403	Systems Dynamics and Simulation	C	3	-
BU- GEG 404	Numerical Methods	C	-	3
GET 490	SIWES III: Students Industrial Work Experience		-	4
	TOTAL (38 Credits)		20	18

NOTE:

*GET 404 – Engineering Valuation and Costing – 6 Weeks

*GET 490 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF CIVIL ENGINEERING (B.ENG.)
500 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/ Elective	SEMESTER	
			1 ST	2 ND
GST 001,002	Citizenship Orientation	C	0	0
BU – GST 500	Seminar on Adventist Heritage	C	-	3
BU – GST 540	Introduction to Digital Marketing	C	1	-
GET 501	Engineering Project Management	C	3	-
GET 502	Engineering Law	C	-	2
CEE 506	Construction Engineering	C	-	3
BU – CEE 501	Building Services Engineering	C	3	-
BU – CEE 502	Waste to Wealth Circular Economy	C	-	3
BU – CEE 503	Civil Engineering Practice	C	3	-
BU – CEE 501	Tunnel Engineering	C	2	-
CEE 590	Project	C	-	6
OPTIONS				
	STRUCTURAL ENGINEERING			
BU-CEE 511	Structural Design	C	2	-
BU-CEE 512	Advanced Structural Analysis	C	2	-
	WATER RESOURCES AND ENVIRONMENTAL ENGINEERING			
BU-CEE 521	Water Resources Engineering	C	2	-
BU-CEE 522	Environmental Engineering	C	2	-
	GEOTECHNICAL AND FOUNDATION ENGINEERING			
BU-CEE 531	Geotechnical Engineering	C	2	-
BU-CEE 532	Foundation Engineering	C	2	-
	HIGHWAY AND TRAFFIC ENGINEERING			
BU-CEE 541	Highway and Traffic Engineering	C	2	-
BU-CEE 542	Urban Transportation	C	2	-
	TOTAL (33 Credits)		16	17

Note – the students are to register for two electives in the first semester from the same area of specialization.

**B. Eng. CIVIL ENGINEERING
COURSE DESCRIPTIONS**

GST 001,002 CITIZENSHIP ORIENTATION

0, 0

These are non-credit, but mandatory seminars where students are mentored in all aspects of Christian life. It discusses many topics with the hope of modeling best moral practices on students. Students received either a satisfactory or unsatisfactory grade at the end of the semester.

GST 111 COMMUNICATION IN ENGLISH

(2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Identify possible sound patterns in English Language;
2. List notable language skills;
3. Classify word formation processes;
4. Construct simple and fairly complex sentences in English;
5. Apply logical and critical reasoning skills for meaningful presentations;
6. Demonstrate an appreciable level of the art of public speaking and listening; and
7. Write simple and technical reports.

Course Contents

Sounds and sound patterns in English Language (vowels and consonants, phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). major word formation processes; the sentence in English (types: structural and functional). grammar and usage (tense, concord and modality). Reading and types of reading, comprehension skills, 3RsQ. Logical and critical thinking; reasoning methods (logic and syllogism, inductive and deductive argument, analogy, generalization and explanations). Ethical considerations, copyright rules and infringements. Writing activities (pre-writing (brainstorming and outlining). writing (paragraphing, punctuation and expression). post- writing (editing and proofreading). Types of writing (summary, essays, letter, curriculum vitae, report writing, note-making). Mechanics of writing. Information and Communication Technology in modern language learning. Language skills for effective communication. The art of public speaking.

GST 112 NIGERIAN PEOPLES AND CULTURE

(2 Units C: LH 30)

Learning Outcomes

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

1. Analyze the historical foundation of Nigerian cultures and arts in pre-colonial times;
2. Identify and list the major linguistic groups in Nigeria;
3. Explain the gradual evolution of Nigeria as a political entity;
4. Analyze the concepts of trade and economic self-reliance of Nigerian peoples in relation to national development;
5. Enumerate the challenges of the Nigerian state regarding nation building;
6. Analyze the role of the judiciary in upholding fundamental human rights
7. Identify the acceptable norms and values of the major ethnic groups in Nigeria; and
8. List possible solutions to identifiable Nigerian environmental, moral and value problems.

Course Contents

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and cultures; peoples and cultures of the minority ethnic groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concepts of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigerian peoples; trade, skill acquisition and self-reliance). Social justice and national development (definition and classification of law); Judiciary and fundamental rights. Individuals, norms and values (basic Nigerian norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts [Cultism, kidnapping and other related social vices]). Re-orientation, moral and national values (The 3Rs – Reconstruction, Rehabilitation and Re-orientation; re-orientation strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

BU – GST 105 USE OF LIBRARY AND STUDY SKILLS (2 Units: C: LH 30)

Learning Outcomes

Upon completion of this course, students would have learnt to:

1. Explain the origin of three writing materials from the ancient to information age
2. Explain four types of libraries
3. Explain six importance of libraries in the educational and learning process
4. Explain five importance of Libraries and Information in the Educational and Learning Process
5. Discuss five Sections in the Library and functions performed
6. Explain two Classification Scheme & Library Catalogues
7. Explain four Information Search Tools
8. State four social issues relating to Libraries and rules for users
9. Explain two reference styles

Course Contents

Ancient period to Information age. Evolution of writing Materials. Concept of library. Types of library and information centers. Sections in the library. Parts of book. Electronic Information Resources. Bibliographic entries. Bibliographic control. Library Catalogue. Filling Shelving. Shelve reading. Library automation. Library software applications. Information networking and sharing. How to study. The brain. Memory retention mechanism. Search tools. Information retrieval tools. Reference styles. Social issues relating to Libraries and Information centers. Preparation for academic success.

Minimum Academic Standard

Library

BU – GST 112 HEALTH PRINCIPLES (1 Unit: C: LH 15)

Learning Outcomes

On completion of the course, students should be able to:

1. Define health according to World Health Organisation
2. State five (5) components and the human body and their function
3. Describe at least three (3) determinants of health and well-being

4. List five (5) factors that mental health
5. Explain two (2) current health trends

Course Contents

Meaning of health. Ecology of human disease. Biblical foundation health. Determinants of health. Basic human anatomy and physiology. Body defense mechanism. Element of nutrition. Health implication of nutrition for health. Personal and environment hygiene. Environmental pollution. Substance Abuse. Health implication of substance abuse. Mental health and well- being. Stress coping mechanism. Body pH and Health. Current trends in Health. Sport health and physical activity.

Minimum Academic Standards

Nil

BU – GST 120 ICT FUNDAMENTALS & OFFICE PRODUCTIVITY MANAGEMENT (1 Unit: C: LH 15, PH 45)

Learning Outcome

On completion of the course, students should be able to:

Word:

- i. creating text documents
- ii. editing and formatting the existing documents
- iii. making a text document interactive with different features and tools
- iv. graphical documents, comprising images
- v. used by Authors and Researchers
- vi. detect grammatical errors in a text document.

Excel:

- i. perform data entry and storage
- ii. collection and Verification of business data
- iii. administrative and managerial duties
- iv. accounting and budgeting
- v. data Analysis
- vi. reporting + Visualizations
- vii. forecasting.

PowerPoint:

- i. create presentations from scratch or a template
- ii. add text, images, art, and videos
- iii. select a professional design with PowerPoint Designer.

COURSE CONTENT

Word:

Getting started with word. Adding tables. Controlling page appearance. Formatting text and paragraphs. Inserting graphic objects. Managing lists. Preparing to publish. Working more efficiently. Controlling the follow of a document. Customizing formats using styles and themes. Inserting content using quick parts. Organizing content using tables and charts. Simplifying and managing long documents. Using mail merge. Using templates to automate document formatting.

PowerPoint:

Getting started with PowerPoint. Preparing a PowerPoint presentation. Performing advanced text editing operations. Adding graphical elements to your presentation. Modifying objects in your presentation. Adding tables to your presentation. Adding charts to your presentation. Preparing to deliver your presentation. Adding SmartArt math equations to a presentation. Collaborating on a presentation. Customizing a slide show. Customizing design templates. Modifying the PowerPoint environment. Securing and distributing a presentation. Working with media and animations.

Excel:

Getting started with excel. Formatting a worksheet. Managing workbooks. Modifying a worksheet. Performing calculations. Printing workbooks.

Lab Work: Students will undertake the following tasks in the practical classes; Learn how to use Microsoft Word to create resumes, reports, and write letters & as a simple text editor.

Learn how to use MS Excel in business analysis, managing lists of people, operations management, and performance reporting & for office administration, project management, and managing programs, contracts and accounts.

Learn how to use PowerPoint to create a slideshow of valuable information through charts, and images for a presentation.

Minimum Academic Standard: Computer studio and simulation Laboratory with NUC-MAS requirement facilities.

BU – GST 126 LIFE AND TEACHINGS OF CHRIST THE MESSIAH (3 Units: C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the historicity of Jesus Christ, using at least five (5) biblical and extant literature;
2. Explore five (5) religio-political and socio-economic events in Palestine during Jesus' time.
3. Enumerate five (5) evidences that Jesus Christ came at the fullness of time;
4. Identify at least three (3) theological implications of the Incarnation;
5. Contrast between Jewish and Jesus' views of the Kingdom;
6. Enumerate any seven (7) teachings of Jesus Christ;
7. Describe any five (5) events leading to Jesus' arrest and crucifixion;
8. Enumerate any five (5) theological implications of Jesus' death and resurrection;

Course Contents

The world which Jesus met and worked in. God with Us. Historicity of Jesus Christ. The fullness of Time. Childhood and Youth of Jesus. The Baptism of Jesus. The temptation of Jesus. The Gospel of the kingdom. The Ministry Jesus Christ. The Mission of Jesus Christ. Jesus' Teaching Methods. The Sermon on the Mount. The last days of Christ earthly life. Gethsemane Experience. Jesus' Arrest. Judgement of Jesus. The Crucifixion. Burial and Resurrection. Jesus' Appearances. Theological implications of Jesus Resurrection and teachings.

Minimum Academic Standards

Standard University Library

Learning Outcomes

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

1. Define atom, molecules and chemical reactions;
2. Discuss the modern electronic theory of atoms;
3. Write electronic configurations of elements on the periodic table;
4. Rationalise the trends of atomic radii, ionisation energies, electronegativity of the elements, based on their position in the periodic table;
5. Identify and balance oxidation–reduction equation and solve redox titration problems;
6. Draw shapes of simple molecules and hybridised orbitals;
7. Identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship;
8. Apply the principles of equilibrium to aqueous systems using LeChatelier’s principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures;
9. Analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy; and
10. Determine rates of reactions and its dependence on concentration, time and temperature.

Course Contents

Atoms, molecules, elements and compounds, and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence forces; Structure of solids. Chemical equations and stoichiometry; chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

CHM 102 GENERAL CHEMISTRY II

(2 Units C: LH 30)

Learning Outcomes

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

1. State the importance and development of organic chemistry;
2. Define fullerenes and its applications;
3. Discuss electronic theory;
4. Determine the qualitative and quantitative of structures in organic chemistry;
5. State rules guiding nomenclature and functional group classes of organic chemistry;
6. Determine the rate of reaction to predict mechanisms of reaction;
7. Identify classes of organic functional group with brief description of their chemistry;
8. Discuss comparative chemistry of group 1A, IIA and IVA elements; and
9. Describe basic properties of transition metals.

Course Contents

Historical survey of the development and importance of organic chemistry; fullerenes as fourth allotrope of carbon, uses as nanotubes, nanostructures, nanochemistry. Electronic theory in organic chemistry. Isolation and purification of organic compounds; determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry; nomenclature and functional group classes of organic compounds. Introductory reaction mechanism and kinetics. Stereochemistry. The

Course Contents

Elementary set theory, subsets, union, intersection, complements, 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 of any magnitude, addition and factor formulae.

MTH 102 ELEMENTARY MATHEMATICS II (Calculus) (2 Units C: LH 30)

Learning Outcomes

At the end of the course, students should be able to:

1. Identify the types of rules in differentiation and integration;
2. Recognise and understand the meaning of function of a real variable, graphs, limits and continuity;
3. Solve some applications of definite integrals in areas and volumes;
4. Solve function of a real variable, plot relevant graphs, identify limits and idea of continuity;
5. Identify the derivative as limit of rate of change;
6. Identify techniques of differentiation and perform extreme curve sketching;
7. Identify integration as an inverse of differentiation;
8. Identify methods of integration and definite integrals; and
9. Perform integration application to areas, volumes.

Course Contents

Functions of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation, maxima and minima. Extreme curve sketching, integration, definite integrals, reduction formulae, application to areas, volumes (including approximate integration: Trapezium and Simpson's rule).

MTH 103 ELEMENTARY MATHEMATICS III (Vectors, Geometry and Dynamics) (2 Units C: LH 30)

Learning Outcomes:

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

1. solve some vectors in addition and multiplication.
2. calculate force and momentum.
3. solve differentiation and integration of vectors.
4. analyse kinematics of a particle.

Course Contents

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, scalar, multiplication of vectors, linear independence. Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normals. Kinematics of a particle. Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion under gravity, projectiles and resisted vertical motion. Elastic string and simple pendulum. Impulse, impact of two smooth spheres and a sphere on a smooth surface.

PHY 101 GENERAL PHYSICS I (Mechanics) (2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Identify and deduce the physical quantities and their units;
2. Differentiate between vectors and scalars;
3. Describe and evaluate motion of systems on the basis of the fundamental laws of mechanics;
4. Apply Newton's laws to describe and solve simple problems of motion;
5. Evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. Explain and apply the principles of conservation of energy, linear and angular momentum;
7. Describe the laws governing motion under gravity; and
8. Explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

Course Contents

Space and time; units and dimension, vectors and scalars, differentiation of vectors: displacement, velocity and acceleration; kinematics; Newton's laws of motion (inertial frames, impulse, force and action at a distance, momentum conservation); relative motion; application of Newtonian mechanics; equations of motion; conservation principles in Physics, conservative forces, conservation of linear momentum, kinetic energy and work, potential energy, system of particles, centre of mass; rotational motion; torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates; conservation of angular momentum; circular motion; moments of inertia, gyroscopes and precession; gravitation: Newton's law of gravitation, Kepler's laws of planetary motion, gravitational potential energy, escape velocity, satellites motion and orbits.

PHY 102 GENERAL PHYSICS II (ELECTRICITY & MAGNETISM) (2 Units C: LH 30)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the electric field and potential and related concepts, for stationary charges;
2. Calculate electrostatic properties of simple charge distribution using Coulomb's law, Gauss's Law and electric potential;
3. Describe and determine the magnetic field for steady and moving charges;
4. Determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. Describe electromagnetic induction and related concepts and make calculations using Faraday and Lenz's laws;
6. Explain the basic physical of Maxwell's equations in integral form;
7. Evaluate DC circuits to determine the electrical parameters; and
8. Determine the characteristics of AC voltages and currents in resistors, capacitors and Inductors.

Course Contents

Forces in nature, electrostatics, electric charge and its properties, methods of charging, Coulomb's law and superposition, electric field and potential, Gauss's law, capacitance, electric dipoles, energy in electric fields, conductors and insulators, current, voltage and resistance, Ohm's law and analysis of DC circuits, magnetic fields, Lorentz force, Biot-Savart and Ampère's laws, magnetic dipoles, dielectrics, energy in magnetic fields, electromotive force, electromagnetic induction, self and mutual inductances, Faraday and Lenz's laws, step up and step down transformers. Maxwell's equations, electromagnetic oscillations and waves, AC voltages and currents applied to inductors, capacitors, resistance and combinations.

PHY 103 GENERAL PHYSICS III (BEHAVIOUR OF MATTER) (2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Explain the concepts of heat and temperature and relate the temperature scales;
2. Define, derive and apply the fundamental thermodynamic relations to thermal systems;
3. Describe and explain the first and second laws of thermodynamics, and the concept of entropy;
4. State the assumptions of the kinetic theory and apply techniques of describing macroscopic behaviour;
5. Deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium; and
6. Describe and determine the effect of forces and deformation of materials and surfaces.

Course Contents

Heat and temperature, temperature scales; gas laws; general gas equation; thermal conductivity; first Law of thermodynamics; heat, work and internal energy, reversibility; thermodynamic processes; adiabatic, isothermal, isobaric; second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; molecular collisions and mean free path; elasticity; Hooke's law, Young's shear and bulk moduli; hydrostatics; pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 104 GENERAL PHYSICS III (VIBRATION, WAVES AND OPTICS)

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe and quantitatively analyse the behaviour of vibrating systems and wave energy;
2. explain the propagation and properties of waves in sound and light;
3. identify and apply the wave equations; and
4. explain geometrical optics and principles of optical instruments.

Course Contents

Simple harmonic motion (SHM): energy in a vibrating system, Damped SHM, Q values and power response curves, Forced SHM, resonance and transients, Coupled SHM. Normal modes. Waves: types and properties of waves as applied to sound; Transverse and Longitudinal waves; Superposition, interference, diffraction, dispersion, polarization; Waves at interfaces; Energy and power of waves, the 1-D wave equation, 2-D and 3-D wave equations, wave energy and power, phase and group velocities, echo, beats, the Doppler effect, Propagation of sound in gases, solids and liquids and their properties. Optics: Nature and propagation of light; reflection, refraction, and internal reflection, dispersion, scattering of light, reflection and refraction at plane and spherical surfaces, thin lenses and optical instruments, wave nature of light; Huygens's principle, interference and diffraction.

PHY 107 GENERAL PRACTICAL PHYSICS I

(1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;

4. Plot and analyse graphs; and
5. Draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements. Experimental techniques. The treatment of measurement errors. Graphical analysis. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc. (covered in PHY 101, 102, 103 and PHY 104). However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis, and deduction.

PHY 108 GENERAL PRACTICAL PHYSICS II (1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs;
5. Draw conclusions from numerical and graphical analysis of data; and
6. Prepare and present practical reports.

Course Contents

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses that have been covered with emphasis on quantitative measurements, the treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

STA 112 PROBABILITY I (3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the differences between permutation and combination;
2. explain the concept of random variables and relate it to probability and distribution functions;
3. describe the basic distribution functions; and
4. explain the concept exploratory data analysis.

Course Contents

Permutation and combination. Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distributions: Binomial, geometric, Poisson, normal and sampling distributions; exploratory data analysis.

GET 101 ENGINEER IN SOCIETY (1 Unit C: LH 15)

Learning Outcomes

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

1. Differentiate between science, engineering and technology, and relate them to innovation;
2. Distinguish between the different cadres of engineering – engineers, technologists, technicians and craftsmen and their respective roles and competencies;
3. Identify and distinguish between the relevant professional bodies in engineering;

4. Categorise the goals of global development or sustainable development goals (SDGs); and
5. Identify and evaluate safety and risk in engineering practice.

Course Contents

History, evolution and philosophy of science. engineering and technology. The engineering profession – engineering family (engineers, technologists, technicians and craftsmen), professional bodies and societies. Engineers' code of conduct and ethics, and engineering literacy. Sustainable development goals (SDGs), innovation, infrastructures and nation building - economy, politics, business. Safety and risk analysis in engineering practice. Engineering competency skills – curriculum overview, technical, soft and digital skills. Guest seminars and invited lectures from different engineering professional associations.

GET 102 ENGINEERING GRAPHICS AND MODELLING I (2 Units C: LH 15; PH 45)

Learning Outcomes

1. At the end of this course, the students should be able to:
2. Have a good grasp of design thinking and be obsessed with the determination to apply such to solving simple every day and also complex problems;
3. Recognise the fundamental concepts of engineering drawing and graphics;
4. Show skills to represent the world of engineering objects in actionable solid models, and put such models in a form where they can be inputs for simulation and analyses;
5. Analyse such models for strength and cost;
6. Prepare the objects for modern production and manufacturing techniques of additive and subtractive manufacturing;
7. Recognise that engineering is multidisciplinary in the sense that mechanical, electrical and other parts of physical structures are modelled in context as opposed to the analytical nature of the courses they take; and
8. Analyse and master the basics of mechanical and thermal loads in engineering systems.

Course Contents

Introduction to design thinking and engineering graphics. First and third angle orthogonal projections. Isometric projections; sectioning, conventional practices, conic sections and development. Freehand and guided sketching – pictorial and orthographic. Visualization and solid modelling in design, prototyping and product-making. User interfaces in concrete terms. Design, drawing, animation, rendering and simulation workspaces. Sketching of 3D objects. Viewports and sectioning to shop drawings in orthographic projections and perspectives. Automated viewports. Sheet metal and surface modelling. Material selection and rendering. This course will use latest professional design tools such as fusion 360, solid works, solid edge or equivalent.

CEE 101: INTRODUCTION TO CIVIL ENGINEERING (2 Unit C: LH 30)

Learning Outcomes

Upon the successful completion of this course, students should be able to:

1. explain the profession of civil engineering and
2. the roles played by civil engineers.

Course Contents

History of civil engineering. Branches of civil engineering. Roles of civil engineers in government, industry and academia. Allied professionals and their interaction with civil engineers. Career opportunities in civil engineering, professional and regulatory bodies.

ENT 211 ENTREPRENEURSHIP AND INNOVATION

(2 Units C: LH 30)

Learning Outcomes

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

1. Explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation and risk-taking;
2. State the characteristics of an entrepreneur;
3. Analyse the importance of micro and small businesses in wealth creation, employment generation and financial independence;
4. Engage in entrepreneurial thinking;
5. Identify key elements in innovation;
6. Describe the stages in enterprise formation, partnership and networking, including business planning;
7. Describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world; and
8. State the basic principles of e-commerce.

Course Contents

The concept of entrepreneurship (entrepreneurship, intrapreneurship/corporate entrepreneurship); theories, rationale and relevance of entrepreneurship (Schumpeterian and other perspectives, risk-taking, necessity and opportunity-based entrepreneurship, and creative destruction); characteristics of entrepreneurs (opportunity seeker, risk-taker, natural and nurtured, problem solver and change agent, innovator and creative thinker); entrepreneurial thinking (critical thinking, reflective thinking and creative thinking).

Innovation (The concept of innovation, dimensions of innovation, change and innovation, knowledge and innovation). Enterprise formation, partnership and networking (basics of business plan, forms of business ownership, business registration and alliance formation, and joint ventures). Contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office and networking). Entrepreneurship in Nigeria (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

GST 212 PHILOSOPHY, LOGIC AND HUMAN EXISTENCE (2 Units C: LH 30)

Learning Outcomes

At the end of the course, students should be able to:

1. Know the basic features of philosophy as an academic discipline;
2. Identify the main branches of philosophy & the centrality of logic in philosophical discourse;
3. Know the elementary rules of reasoning;
4. Distinguish between valid and invalid arguments;
5. Think critically and assess arguments in texts, conversations and day-to-day discussions;
6. Critically assess the rationality or otherwise of human conduct under different existential conditions;
7. Develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge, and
8. Guide his or her actions, using the knowledge and expertise acquired in philosophy and logic.

Course Contents

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal

fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character molding.

BU – GST 200 COMMUNICATION IN FRENCH

(1 Units: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Abilities to greet
2. Knowing how to express time.
3. Knowledge of counting up 1000
4. Conjugaison of Etre and Avoir and be able to form sentences with the auxiliaries
5. Use pronoun instead of names
6. Make sentences in present tense with the verbs
7. Presentation of oneself in French Language.
8. Essay witing.

Course Contents

Alphabet. Salutation. L’heure. Le nombre. Le pronom personnel et l’auxiliaire Avoir et Être Les trois groupe verbes au présent de l’indicatif () premier groupe verbe, Deuxième groupe verbe, Troisième groupe verbe) Adjective possessive, Adjective Démonstratif etc et présentation

BU – GST 215 ADVENTIST HERITAGE

(3 Units: C: LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Explain the history of the Seventh-day Adventist Church.
2. Illustrate the systematic development of the Seventh-day Adventist Church.
3. State the contributions of at least five (5) pioneers of the Seventh-day Adventist Church.
4. Explain the seven (7) pillars of the Seventh-day Adventist church doctrine.
5. Describe the Seventh-day Adventists’ concepts of holistic education, health reforms, and publishing ministries.
6. Identify at least eight (8) major contributions of Adventist education, health reforms, and publishing ministries.
7. Enumerate at least (7) areas in which the prophetic gift has shaped the mission of the Seventh-day Adventist Church.
8. Explain the meaning of Adventism and the aim of Adventist mission.
9. Describe the dynamics involved in the origin and growth of Seventh-day Adventism in Africa.
10. List at least eight (8) major contributions of the Seventh-day Adventism in Africa, with specific focus on national growth and development.

Course Contents

The historical and prophetic origin of the Seventh-day Adventist Church. Millerite roots, before 1844. The 1844 experiences. The development and organization of the Seventh-day Adventist Church. The era of doctrinal and organizational development (1844 – 1863). The era of institutional and lifestyle development (1863ff). The era of revival, reform, and expansion (1888 – 1900). The era of reorganization and Crisis (1901 - 1910). The era of worldwide growth (1910 – 1955). The challenges and possibilities of

maturity (1955). The contributions of the pioneers and founders of the Seventh-day Adventist Church. The Pillars of Adventism. Adventists' concepts of holistic education. Healthcare and reforms. Publishing ministries. The prophetic gift in the Seventh-day Adventist Church. Significance of prophetic gift to the Adventist Mission. The purpose of Adventism. Adventist concept of mission. The origin, exploits and challenges of Seventh-day Adventism in Africa. Contributions of the Seventh-day Adventism in Africa.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts.

BU – GST 220 ORIGIN OF SCIENCE

(1 Unit: C: LH 15)

Learning Outcomes:

On completion of the course, the students should be able to:

1. Outline the major steps of the scientific method and its limitations.
2. Describe three (3) scientific theories on the origin of life and their major challenges.
3. State two (2) characteristics of a molecular structure that posed challenges to evolution.
4. Identify one (1) strength and drawback of the geologic column and fossil record to the evolutionary concept.
5. State two (2) evidences in nature and archeology that support Biblical creation account.
6. List three (3) faith-believing and non-faith scientists and their major contributions to science.
7. List two (2) alternative theories to evolution and their evidence.
8. Discuss the harmony between science and religion.

Course Contents

Religion and Science. Origin, Creation and the Flood. Scientific theories about the Origin of Life. Darwinism and theory of Evolution. Micro- and Macro-evolution. Geologic column, Fossil record. Aspects of Human origin. Drawback to the theory of evolution and Darwinism. Cambrian explosion. Incompleteness of the Fossil record. Origin of the Universe and the Total Environment. The Big bang theory. Scientific dating and drawback. Alternative theories of Origin. Intelligent Design (ID). Molecular machines and Irreducible Complexity (IC). Specificity and regulation of the DNA. Fine tuning of the Universe. Uniqueness of the Planet Earth and Life. The Flood. The Scientific method and Limitations of Science. Science, Reasoning and Faith.

Minimum Academic Standards

None.

BU – GST 221 INTRODUCTION TO AGRICULTURE

(1 Unit: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Recall the definition and discuss at least three (3) of the branches of agriculture.
2. Critique five important agricultural policies in Nigeria.
3. Discuss the objectives of Soil Science.
4. Discuss 5 physical properties of soil.
5. Discuss the characteristics of different soil types.
6. Discuss the reasons for losses of agricultural soil
7. Discuss different types of agricultural systems and practices with relevant examples in Nigeria
8. Describe the different types of crops with examples from across Nigeria

9. Discuss the problems facing livestock producers across Nigeria
10. Describe 3 common management practices in poultry/livestock production.

Course Contents

Introduction to Agriculture, its origin, branches and importance; Definition, scope and objectives & review of Agricultural policies; Introduction to soil science, its aims and objectives; Soil formation and soil physical properties; Erosion; Introduction to Crop Science (Agricultural systems/practices); Livestock production (importance & problems of livestock industry); Production practices of some selected ruminants, monogastric & non-ruminant herbivores; Non-conventional livestock production practices

Minimum Academic Standards

Field experimental plots

BU – GST 290 INTRODUCTION TO DATA ANALYTICS (1 Unit: C: LH 15; PH 45)

Learning Outcome

On completion of the course. Students should be able to do:

1. uncertainty analysis
2. data fitting
3. feed-forward neural networks
4. probability density functions
5. correlation functions
6. fourier analysis and FFT procedures
7. spectral analysis
8. digital filtering
9. hilbert transforms.

Course Content

Connecting to data. Simplifying and sorting data. Organizing data. Posing a question. Wrangling data into a format. fixing data problems. exploring the data. finding patterns. building intuition. comparing measures. Statistics and forecasting. Dashboards and stories.

Lab Work: Students will undertake the following tasks in the practical classes; learn how to analyze data to understand data through natural language queries that allows to ask questions about data without having to write complicated formulas. In addition, students will learn how to analyze data to provide high-level visual summaries, trends, and patterns.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement.

GET 201 APPLIED ELECTRICITY (3 Units C: LH 30; PH 45)

Learning Outcomes

Students will be able to:

1. Discuss the fundamental concepts of electricity and electrical d.c. Circuits;
2. State, explain and apply the basic d.c. circuit theorems;
3. Explain the basic a.c. circuit theory and
4. Apply to solution of simple circuits.

Course contents

Fundamental concepts: Electric fields, charges, magnetic fields. current, B-H curves Kirchhoff's laws, superposition. Thevenin, Norton theorems, Reciprocity, RL, RC, RLC circuits. DC, AC bridges, Resistance, Capacitance, Inductance measurement, Transducers, Single phase circuits, Complex j - notation, AC circuits, impedance, admittance, susceptance.

GET 202 ENGINEERING MATERIALS

(3 Units C: LH 45)

Learning Outcomes

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

1. Demonstrate the role of atoms and molecules (aggregates of atoms) in the building of solid/condensed matter known as engineering materials, the electrons quantum numbers and how the electrons are arranged in different atomic elements, and explain the role of electronic configuration and valence electrons in bonding;
2. Define metals, alloys and metalloids, demonstrate mental picture of the solid mineral resources development as a relay race among four 'athletes': geologist, mining engineer, mineral processing technologist, process metallurgical engineer, and classify metallurgical engineering into 3Ps: process, physical and production;
3. Explain the relationship between structure and properties of materials, characteristics, components and compositions of phase diagrams and phase transformations of solid solutions;
4. Define ceramics, glass and constituents of glasses and understand application of ceramics in mining, building, art and craft industries;
5. Define and classify polymers as a class of engineering materials and polymeric materials, demonstrate polymerisation reactions, their types and mechanism, and applications of polymers;
6. Define properties, types and application of composite materials and fibres (synthetic and natural);
7. Define and classify nanomaterials, demonstrate applications of nanomaterials, concept, design and classification of fracture mechanics, corrosion classification, including the five principal ways of controlling corrosion and metal finishing processes such as sherardising, galvanising and anodising; and
8. Identify factors affecting the performance and service life of engineering materials/metals and metallography of metals/materials (materials anatomy), which enables metallurgical and materials engineers to prescribe appropriate solutions to test metals/materials fitness in service through structure-property-application relationships.

Course Contents

Basic material science; atomic structure, atomic bonding and crystal structures. Engineering materials situating metals and alloys; metals and alloys, classifications of metals, metal extraction processes using iron and steel (ferrous) and aluminium (nonferrous) as examples, phase diagrams/iron carbon diagrams, and mechanical workings of metals. Selection and applications of metals and alloys for specific applications in oil, aerospace, construction, manufacturing and transportation industries, among others. Ceramics (including glass); definition, properties, structure and classifications of ceramics. Bioactive and glass – ceramics. Toughening mechanism for ceramics. Polymers; definition of polymers as engineering materials, chemistry of polymeric materials, polymer crystallisation, polymer degradation and aging. Thermoplastic and thermosetting polymers and concepts of copolymers and homopolymers. Composites; definition, classification, characterisation, properties and composite. Applications of composites. Nanomaterials; definition, classification and applications of nanomaterials as emerging technology. Processing of nanomaterials including mechanical grinding, wet chemical synthesis, gas phase synthesis, sputtered plasma processing, microwave plasma processing and laser ablation. Integrity assessment of engineering materials; effect of engineering design, engineering materials processing, selection, manufacturing and assembling on the performance and service life of engineering materials.

Metallography and fractography of materials. Mechanical testing (destructive testing) of materials such as compressive test, tensile test, hardness test, impact test, endurance limit and fatigue test. Non-destructive test (NDT) such as dye penetrant, x-ray and eddy current.

GET 204 STUDENT WORKSHOP PRACTICE (2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Identify various basic hands and machine tools, analogue and digital measurement devices and instruments, and acquire skills in their effective use and maintenance;
2. Explain the various forms of Measurements such as Straightness Measurements, Flatness Measurement, Roundness Measurements and Surface Finishing Measurements.
3. Describe Tolerances and quality, Fits, Clearance, transition and interference fits.
4. Explain the basic principles in Super micro-metry and Comparator-Profilometry
5. Practically apply basic engineering technologies, including metrology, casting, metal forming and joining, materials removal, machine tooling (classification, cutting tool action, cutting forces, non-cutting production) and CNC machining technology;
6. Master workshop and industrial safety practices, accident prevention and ergonomics;
7. Physically recognise different electrical & electronic components like resistances, inductances, capacitances, diodes, transistors and their ratings;
8. Connect electric circuits, understand different wiring schemes, and check ratings of common household electrical appliances and their basic maintenance; and
9. Determine household and industrial energy consumption, and understand practical energy conservation measures.
10. Apply the basic principles of Collimators in Machine Installations.

Course Contents

The course comprises general, mechanical and electrical components: supervised hands-on experience in safe usage of tools and machines for selected tasks;

Metrology: Theory and practice of high precision. Forms of Measurements. Straightness Measurements. Flatness Measurement. Roundness Measurements. Surface Finishing Measurements. Mechanical measurements under strict control conditions. Measurements of Engineering Properties. Linear and Angular Measurements. Super micro-metry, Comparator-Profilometry, Collimators. Application in Machine Installations. Tolerances and quality. Limits and Fits - Transition and interference fits. Clearance. Measurement of Engineering Properties. Use of measuring instruments (calipers, micrometers, gauges, sine bar, wood planners, saws, sanders, and pattern making).

Machine shop: lathe work shaping, milling, grinding, reaming, metal spinning. Hand tools, gas and arc welding, cutting, brazing and soldering. Foundry practice. Industrial safety and accident prevention, ergonomics. Casting processes. Metal forming processes: hot-working and cold-working processes (forging, press-tool work, spinning, etc.). Metal joining processes (welding, brazing and soldering). Heat treatment. Material removal processes. machine tools and classification. Simple theory of metal cutting. Tool action and cutting forces. Introduction to CNC machines.

Supervised identification, use and care of various electrical and electronic components such as resistors, inductors, capacitors, diodes and transistors. Exposure to different electric circuits, wiring schemes, analogue and digital electrical and electronic measurements. Household and industrial energy consumption measurements. Practical energy conservation principles.

GET 205 FUNDAMENTALS OF FLUID MECHANICS

(3 Units C: LH 45)

Learning Outcomes

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

1. Explain the properties of fluids;
2. Determine forces in static fluids and fluids in motion;
3. Determine whether a floating body will be stable;
4. Determine the effect of various pipe fittings (valves, orifices, bends and elbows) on fluid flow in pipes;
5. Measure flow parameters with venturi meters, orifice meters, weirs;
6. Perform calculations based on principles of mass, momentum and energy conservation;
7. Perform dimensional analysis and simple fluid modelling problems; and
8. Specify the type and capacity of pumps and turbines for engineering applications.

Course Contents

Fluid properties, hydrostatics, fluid dynamics using principles of mass, momentum and energy conservation from a control volume approach. Flow measurements in pipes, dimensional analysis, and similitude, 2-dimensional flows. Hydropower systems.

GET 206 FUNDAMENTALS OF ENGINEERING THERMODYNAMICS

(3 Units C: LH 45)

Learning Outcomes

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

1. Describe basic concepts of thermodynamics, quantitative relations of Zeroth, first, second and third laws;
2. Define and explain system, surrounding, closed and open system, control volume and control mass, extensive and intensive properties;
3. Calculate absolute and gage pressure, and absolute temperature, calculate changes in kinetic, potential, enthalpy and internal energy;
4. Evaluate the properties of pure substances i.e. Evaluate the state of the pure substances such as compressed liquid, saturated liquid-vapour mixture and superheated vapour using property diagrams and tables; arrange the ideal and real gas equations of state,
5. Formulate the first law of thermodynamics for a closed system i.e. Organize the change in energy in the closed systems via heat and work transfer;
6. Distinguish heat transfer by conduction, convection and radiation, and calculate the amount of heat energy transferred;
7. Calculate the changes in moving boundary work, spring work, electrical work and shaft work in closed systems;
8. Apply the first law of thermodynamics for closed systems and construct conservation of mass and energy equations;
9. Formulate the first law of thermodynamics to the open systems i.e. Describe steady-flow open system, apply the first law of thermodynamics to the nozzles, diffusers, turbines, compressors, throttling valves, mixing chambers, heat exchangers, pipe and duct flow;
10. Construct energy and mass balance for unsteady-flow processes;
11. Evaluate thermodynamic applications using second law of thermodynamics;
12. Calculate thermal efficiency and coefficient of performance for heat engine, refrigerators and heat pumps; and
13. Restate perpetual-motion machines, reversible and irreversible processes.

Course Contents

Basic concepts, definitions and laws (quantitative relations of Zeroth, first, second and third laws of thermodynamics). Properties of pure substances: the two-property rule (P-v-T behaviour of pure substances and perfect gases); state diagrams. The principle of corresponding state; compressibility relations; reduced pressure; reduced volume; temperature; pseudo-critical constants. The ideal gas: specific heat, polytropic processes. Ideal gas cycles; Carnot; thermodynamic cycles, turbines, steam and gas, refrigeration. The first law of thermodynamics – heat and work, applications to open and closed systems. The steady flow energy equation (Bernoulli's equation) and application. Second law of thermodynamics, heat cycles and efficiencies.

GET 207 APPLIED MECHANICS

(3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

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

Course Contents

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

GET 208 STRENGTH OF MATERIALS

(3 Units C: LH 45)

Learning Outcomes

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

1. Recognise a structural system that is stable and in equilibrium;
2. Determine the stress-strain relation for single and composite members based on Hooke's law;
3. Estimate the stresses and strains in single and composite members due to temperature changes;
4. Evaluate the distribution of shear forces and bending moments in beams with distributed and concentrated loads;
5. Determine bending stresses and their use in identifying slopes and deflections in beams;
6. Use Mohr's circle to evaluate the normal and shear stresses in a multi-dimensional stress system and transformation of these stresses into strains;
7. Evaluate the stresses and strains due to torsion on circular members; and
8. Determine the buckling loads of columns under various fixity conditions at the ends.

Course Contents

Consideration of equilibrium in composite members. Stress-strain relation. Axial load and statically indeterminate axially loaded members. Generalised Hooke's law. Stresses and strains due to loading and

temperature changes. Thermal stress. Torsion of circular members. Angle of twist. Statistically indeterminate torque-loaded members. Shear force and bending moments. Bending stresses in beams with symmetrical loading. Bending stresses in beams with combined loadings. Transverse shear. Eccentric axial loading of beams. Stress and strain transformation equations. Mohr's circle. Elastic buckling of columns.

GET 209 ENGINEERING MATHEMATICS I

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Solve qualitative problems based on vector and matrix analyses such as linear independence and dependence of vectors, rank etc;
2. Describe the concepts of limit theory and nth order differential equations and their applications to physical phenomena;
3. Solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables;
4. Describe the applications of double and triple integration in finding the area and volume of engineering solids, and explain the qualitative applications of Gauss, Stoke's and Green's theorem;
5. Explain ordinary differential equations and applications, and develop a mathematical model of linear differential equations, as well as appreciate the necessary and sufficient conditions for total differential equations; and
6. Analyse basic engineering models through partial differential equations such as wave equation, heat conduction equation, etc., as well as fourier series, initial conditions and its applications to different engineering processes

Course Contents

Limits, continuity, differentiation, introduction to linear first order differential equations, partial and total derivatives, composite functions, matrices and determinants, vector algebra, vector calculus, directional derivatives.

GET 210 ENGINEERING MATHEMATICS II

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Describe physical systems using ordinary differential equations (odes);
2. Explain the practical importance of solving odes, solution methods, and analytically solve a wide range of odes, including linear constant coefficient types;
3. Numerically solve differential equations using MATLAB and other emerging applications;
4. Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion, as well as on functions of several variables, including directional derivatives and multiple integrals;
5. Solve problems using the fundamental theorem of line integrals, Green's theorem, the divergence theorem, and Stokes' theorem, and perform operations with complex numbers;
6. Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions of complex variables, as well as the theory of conformal mapping to solve problems from various fields of engineering; and
7. Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula.

Course Contents

Introduction to ordinary differential equations (ODEs); theory, applications, methods of solution; second order differential equations. Advanced topics in calculus (vectors and vector-valued function, line integral, multiple integral and their applications). Elementary complex analysis including functions of complex variables, limits and continuity. Derivatives, differentiation rules and differentiation of integrals. Cauchy-Riemann equation, harmonic functions, basic theory of conformal mapping, transformation and mapping and its applications to engineering problems. Special functions.

GET 211 COMPUTING AND SOFTWARE ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems;
2. Develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from python, java or C++;
3. Use widely available libraries to prepare them for machine learning, graphics and design simulations;
4. Develop skills in eliciting user needs and designing an effective software solution;
5. Recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services; and
6. Acquire capabilities that can further be developed to make them productively employable by means of short internet courses in specific areas;

Course Contents

Introduction to computers and computing; computer organization – data processing, memory, registers and addressing schemes; Boolean algebra; floating-point arithmetic; representation of non-numeric information; problem-solving and algorithm development; coding (solution design using flowcharts and pseudo codes). Data models and data structures; computer software and operating system; computer operators and operators precedence; components of computer programs; introduction to object oriented, structured and visual programming; use of MATLAB in engineering applications. ICT fundamentals, Internet of Things (IoT). Elements of software engineering.

CEE 201 CIVIL ENGINEERING DRAWING (2 Units E: LH 15; PH 45)

Learning Outcomes

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

1. capable of drawing and detailing (by hand and using computer-aided-design skills) civil engineering structures; and
2. identify building structures, highways, pipelines, bridges, dams, foundations and so on using appropriate symbols and conventions.

Course Contents

Drawing and detailing (by hand and using computer-aided-design skills) of civil engineering structures, for example building structures, highways, pipelines, bridges, dams, foundations, etc. utilizing standard symbols and conventions, dimensions, notes, titles, etc. Relationship to specifications.

BU-CEE 202 ELEMENTS OF ARCHITECTURE

(2 Units E: LH15; PH45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. understand dimensions on 2D, 3D, and 4D;
2. understand communications in graphical language;
3. embark on free hand drawings of plans and profiles; and
4. carry out orthogonal drawings and elementary designs.

Course Contents

Introduction - Dimensional awareness, Graphical communication, relation to environments. Free hand drawing - form in terms of shades, light shadow. Common Curves. Orthographies. Dimetrics, perspective projections. Applications. Elementary Designs

GET 290 STUDENT INDUSTRIAL WORK EXPERIENCE I (3 Units C: 9 Weeks)

Learning Outcomes

SIWES I should provide opportunity for the students to:

1. Acquire industrial workplace perceptions, ethics, health and safety consciousness, inter-personal skills and technical capabilities needed to give them a sound engineering foundation;
2. Learn and practise 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.

Course Contents

Practical experience in a workshop or industrial production facility, construction site or special centers in the university environment, considered suitable for relevant practical/industrial working experience but not necessarily limited to the student's major. The students are exposed to hands-on activities on workshop safety and ethics, maintenance of tools, equipment and machines, welding, fabrication and foundry equipment, production of simple devices; electrical circuits, wiring and installation. (8-10 weeks during the long vacation following 200 level).

ENT 312 VENTURE CREATION

(2 Units C: LH 15; PH 45)

Learning Outcomes

At the end of this course, students, through case study and practical approaches, should be able to:

1. Describe the key steps in venture creation;
2. Spot opportunities in problems and in high potential sectors, regardless of geographical location;
3. State how original products, ideas and concepts are developed;
4. Develop a business concept for further incubation or pitching for funding;
5. Identify key sources of entrepreneurial finance;
6. Implement the requirements for establishing and managing micro and small enterprises;
7. Conduct entrepreneurial marketing and e-commerce;
8. Apply a wide variety of emerging technological solutions to entrepreneurship; and
9. Appreciate why ventures fail due to lack of planning and poor implementation.

Course Contents

Opportunity identification (sources of business opportunities in Nigeria, environmental scanning, demand and supply gap/unmet needs/market gaps/market research, unutilized resources, social and climate conditions and technology adoption gap). New business development (business planning, market research). Entrepreneurial finance (venture capital, equity finance, micro-finance, personal savings, small business investment organizations and business plan competition). Entrepreneurial marketing and e-commerce (principles of marketing, customer acquisition & retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E-commerce business models and successful e-commerce companies). Small business management/family business: Leadership & Management, basic book keeping, nature of family business and family business growth model. Negotiation and business communication (strategy and tactics of negotiation/bargaining, traditional and modern business communication methods). Opportunity discovery demonstrations (business idea generation presentations, business idea contest, brainstorming sessions, idea pitching). Technological solutions (The concept of market/customer solution, customer solution and emerging technologies, business applications of new technologies - artificial intelligence (AI), virtual/mixed reality (VR), Internet of things (IoTs), blockchain, cloud computing, renewable energy, etc. Digital business and e-commerce strategies).

GST 312 PEACE AND CONFLICT RESOLUTION

(2 Units C: LH 30)

Learning Outcomes

At the end of this Course, students should be able to:

1. Analyse the concepts of peace, conflict and security;
2. List major forms, types and root causes of conflict and violence;
3. Differentiate between conflict and terrorism;
4. Enumerate security and peace building strategies; and
5. Describe the roles of international organisations, media and traditional institutions in peace building.

Course Contents

The concepts of peace, conflict and security in a multi-ethnic nation. Types and theories of conflicts: ethnic, religious, economic, geo-political Conflicts; structural conflict theory, realist theory of conflict, frustration-aggression conflict theory; root causes of conflict and violence in Africa: indigene and settlers phenomenon, boundaries/boarder disputes, political disputes, ethnic disputes and rivalries, economic inequalities, social disputes, nationalist movements and agitations; selected conflict case studies – Tiv-Junkun, ZangoKartaf, chieftaincy and land disputes, etc. Peace building, management of conflicts and security: Peace & Human Development. Approaches to Peace & Conflict Management (religious, government, community leaders, etc.). Elements of peace studies and conflict resolution: Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and terrorism. Peace mediation and peace keeping. Peace and Security Council (international, national and local levels). Agents of conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution (ADR) (dialogue, arbitration, negotiation, collaboration, etc). The roles of international organizations in conflict resolution ((a) The United Nations, UN and its conflict resolution organs. (b) The African Union & Peace Security Council (c) ECOWAS in peace keeping). The media and traditional institutions in peace building. Managing post-conflict situations/crises: Refugees. Internally Displaced Persons (IDPs); the role of NGOs in post-conflict situations/crises.

5. Develop skills for successful marital and other interpersonal relationships and ways of
6. handling different marital conflicts
7. Effectively and positively apply the knowledge and skills acquired now and in the future
8. in the students' own family and
9. Help individuals, couples or families in making their marital relationships more enjoyable and less crises ridden.

Course Content

Introduction, Definition of family, types of families, Definition of marriage, biblical foundations of marriage, purpose of marriage, characteristics of marriage, processes/stages of marriage Dating, Courtship & Engagement, Good and wrong reasons for dating, Enumerate the benefits of dating, factors to consider during courtship, practices to be avoided during courtship, factors to consider in readiness for marriage. Marriage as a major life decision, foundations of successful marriage, strategies for mate selection, Qualities to look for in a prospective wife, Qualities to look for in a prospective husband, Relevance of domestic training in marriage, Inter-ethnic and inter-racial marriages, Marriage ceremonies and their characteristics, Forbidden marriages, Significance of bride price in African Culture, Honeymoon, Marital Adjustment: Sexual Behavior in marriage, Expected sexual behavior in marriage, Sexual dysfunctions,- Extra-marital affairs, causes, effects and control ,Marital Adjustment: Financial management in marriage and In-laws, Handling financial issues , Family finance and budgeting, Dealing with in-laws,- Siblings relationship in marriage, Establishing a New Home,- Building and furnishing the Home ,Family Roles and Responsibilities role of the father, mother, children Child bearing and child rearing, Family planning methods,- Biblical perspectives on parenting and child rearing, The four parenting styles, Conflict and conflict resolution, Causes of marital conflict, Basic steps on conflict resolution, Divorce in marriage, Causes, effect, control, Domestic Violence.

BU – GST 317 FUNDAMENTALS OF CHRISTIAN FAITH (3 Units C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the history and development of the Old Testament and the New Testament Scripture;
2. Enumerate at least five (5) attributes of God;
3. Identify any seven (7) characteristic features of the Holy Spirit;
4. Assess any five (5) interconnectedness between the Law and grace;
5. Enumerate at least five (5) evidences of the biblical Sabbath;
6. Identify the symbolism and interpretation of the Daniel 2.
7. Assess at least four (4) signs of Christ's Second Coming;
8. Explain at least three (3) of the biblical ordinances in the scriptures
9. Describe any three (3) of the Christian lifestyles

Course Contents

Nature of Inspiration. God's Word. Authenticity of the Bible. Theology of God: His Names & Attributes. The Holy Spirit. Creation. Origin of Sin. Fall of Man. The Flood. Jesus' Incarnation and Ministry of Intercession. Law and Grace. The Sabbath. The Church and its Mission. Prophecy of Daniel 2. Second

Coming. The Signs of the Second Coming. Manner of Jesus' Second Coming. Millennium and the New Earth. Biblical Ordinances. Christian Lifestyles. Prophetic Gift and the Church.

Minimum Academic Standards

Standard Modern library.

GET 301 ENGINEERING MATHEMATICS III (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Demonstrate a clear understanding of the course content, that is, possess a breadth of knowledge in the area covered;
2. Possess an in-depth knowledge upon which a solid foundation can be built in order to demonstrate a depth of understanding in advanced mathematical topics;
3. Develop simple algorithms and use computational proficiency;
4. Write simple proofs for theorems and their applications; and
5. Communicate the acquired mathematical knowledge effectively in speech, writing and collaborative groups.

Course Contents

Linear Algebra. Tensor algebra and analysis, Elements of Matrices, Determinants, Inverses of Matrices, bases representation of tensors. The Euclidean point space and vector spaces. Theory of Linear Equations. Eigen Values and Eigen Vectors. Analytical Geometry. Basic transformations: identity, spherical, Projection and Coordinate Transformation as tensors, Traces, Determinants and other scalar invariants. Equivalent stresses and strains as examples of scalar invariant. Applications to design, analyses and optimization. Elgenvalues, Elgeanvectors of tensors. Solid Geometry. Polar, cylindrical and spherical coordinates. Elements of functions of several variables. Surface Variables. Ordinary Integrals. Evaluation of Double Integrals, Triple Integrals, Line Integrals and Surface Integrals. Derivation and Integrals of Vectors. The gradient of scalar and fiels. Flux of Vectors. The curl of a vector field, Gauss, Greens and Stoke's theorems and applications: Determinations and applications to field equations in linear abd nonlinear mechanics. Singular Valued Functions. Multivalued Functions. Analytical Functions. Cauchy Riemann's Equations. Singularities and Zeroes. Contour Integration including the use of Cauchy's Integral Theorems. Bilinear transformation.

GET 302 ENGINEERING MATHEMATICS IV (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Solve second order differential equations;
2. Solve partial differential equations;
3. Solve linear integral equations;
4. Relate integral transforms to solution of differential and integral equations;
5. Explain and apply interpolation formulas; and
6. Apply Runge-Kutta and other similar methods in solving ODE and PDEs.

Course Contents

Series solution of second order linear differential equations with variable coefficients. Bessel and Legendre equations. Equations with variable coefficients. Sturm-Liouville boundary value problems. Solutions of equations in two and three dimensions by separation of variables. Eigen value problems. Use of operations in the solution of partial differential equations and Linear integral equations. Integral transforms and their inverse including Fourier, Laplace, Mellin and Handel Transforms. Convolution

integrals and Hilbert Transforms. Calculus of finite differences. Interpolation formulae. Finite difference equations. Runge-Kutta and other methods in the solutions of ODE and PDEs. Numerical integration and differentiation.

GET 304 ENGINEERING COMMUNICATION, TECHNICAL WRITING AND PRESENTATION (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the student should be able to:

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

Course Contents

A brief review of common pitfalls in writing. Principles of clear writing (punctuations and capitalization). Figures of speech. Units of grammar. Tenses and verb agreement. Active and passive sentences Lexis and structure Fog Index concept. Skills for communication and communication algorithm. Types and goals of communication; Interpersonal communication; features and the Finger Model or A,B,C,D,E of good interpersonal communication (accuracy of technical terms, brevity of expression, clarity of purpose, directness of focus and effectiveness of the report). Language and organization of reports. Technical report writing skills(steps, problems in writing, distinguishing technical and other reports, significance, format and styles of writing technical reports). Different formats for communication; styles of correspondences – business report and proposal, business letter, memorandum, e-mails, etc. Proposals for projects and research; format, major steps and tips of grant-oriented proposals. Research reports (competency, major steps, components and formats of research reports and publishable communication). Sources and handling of data, tables, figures, equations and references in a report. Presentation skills; overview, tips, organization, use of visual aids and practising of presentation. Intellectual property rights in research reports. Case studies of major engineering designs, proposals and industrial failures with professional presentation of reports.

GET 305 ENGINEERING STATISTICS AND DATA ANALYTICS (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Work with data from the point of view of knowledge convergence, machine learning, and intelligence augmentation, which significantly raises their standard for engineering analysis (the approach forces them to learn statistics in an actionable way that helps them to see the holistic importance of data analytics in modern engineering and technology);
2. Anticipate the future with artificial intelligence while fulfilling the basic requirements of conventional engineering statistical programming consistent with their future careers;
3. Perform, with proficiency, statistical inference tasks with language or programming toolboxes such as r, python, mathematica or matlab, and design expert to summarise, analysis and

interpretation of industry engineering data, and make appropriate conclusions based on such experimental and/or real-life industrial data;

4. Construct appropriate graphical displays of data and highlight the roles of such displays in data analysis, particularly the use of statistical software packages;
5. Plan and execute experimental programmes to determine the performance of programme-relevant industrial engineering systems, and evaluate the accuracy of the measurements undertaken; and
6. Demonstrate mastery of data analytics and statistical concepts by communicating the results of experimental and industry-case investigations, critically reasoned scientific and professional analysis through written and oral presentation.

Course Contents

Descriptive statistics, frequency distribution, populations and sample, central tendency, variance data sampling, mean, median, mode, mean deviation, percentiles, etc. Probability. Binomial, poisson hypergeometric, normal distributions, etc. Statistical inference intervals, test hypothesis and significance. Regression and correlation. Research Methodology. Introduction to big data analytics and cloud computing applications. Introduction to the R language; R as a calculator; Vectors, matrices, factors, data frames and other R collections. Iteration and looping control structures. Conditionals and other controls. Designing, using and extending functions. The Apply Family. Statistical modelling and inference in R.

Practical Contents

Simple measurement of solar radiation, bomb calorimeter determination of calorific value of fuels and biomass; measurement of the velocity of wind, waves and the energy that abound in them; laboratory production of biogas and determination of energy available in it; simple conversion of solar energy to electricity; transesterification of edible oil into biodiesel; simulation of geothermal energy; Geiger-Muller or Scintillation Counters' determination of uranium or thorium energy; simple solid or salt storage of energy; hybrid application of renewable energy.

GET 306: RENEWABLE ENERGY SYSTEM AND TECHNOLOGY

(3 Units C: LH 30 LH 45)

Learning Outcomes

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

1. identify the types, uses and advantages of renewable energy as it relates to climate change and have the capacity to design for use the various renewable energy systems,
2. recognize and analyse the current energy systems in Nigeria, their impacts on development and the global energy demand and supply scenarios,
3. the environmental impact of energy exploitation and utilization, and pursue the sustainable development of renewable energy for various applications,
4. recognize the exploitation, excavation, production, and processing of fossil fuels such as coal, petroleum and natural gas, and discuss the sources, technology and contribution to future energy demands of renewable energy.

Course Content

Current and potential future energy systems in Nigeria and globally - resources, extraction, concepts in energy conversion systems; parallels and differences in various conversion systems and end-use technologies, with emphasis on meeting 21st-century national, regional and global energy needs in a sustainable manner. Various energy technologies in each fuel cycle stage for fossil (oil, gas, synthetic), nuclear (fission and fusion) and renewable (solar, biomass, wind, hydro, and geothermal) energy types - storage, transmission, and conservation. Analysis of energy mixes within an engineering, economic and social context. Sustainable energy; emphasize sustainability in general and in the overall concept of

sustainable development and the link this with sustainable energy as the fundamental benefit of renewable energy.

Practical Content

Simple measurement of solar radiation, Bomb calorimeter determination of calorific value of fuels and biomass; measurement of the velocity of wind, waves and the energy that abound in them; laboratory production of biogas and determination of energy available in it; simple conversion of solar energy to electricity; transesterification of edible oil into biodiesel; simulation of geothermal energy; Geiger-Muller or Scintillation Counters' determination of Uranium or thorium energy; simple solid or salt storage of energy; hybrid application of renewable energy.

GET 307 INTRODUCTION TO ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND CONVERGENT TECHNOLOGIES (3 Units C: LH 45)

Learning Outcomes

At the completion of the course, the students are expected to be able:

1. Explain the meaning, purpose, scope, stages, applications and effects of artificial intelligence;
2. Explain the fundamental concepts of machine learning, deep learning and convergent technologies;
3. Demonstrate the difference between supervised, semi-supervised and unsupervised learning;
4. Demonstrate proficiency in machine learning workflow and how to implement the steps effectively;
5. Explain natural languages, knowledge representation, expert systems and pattern recognition;
6. Describe distributed systems, data and information security and intelligent web technologies;
7. Explain the concept of big data analytics, purpose of studying it, issues that can arise with a data set and the importance of properly preparing data prior to a machine learning exercise; and
8. Explain the concepts, characteristics, models and benefits, key security and compliance challenges of cloud computing.

Course Contents

Concepts of human and artificial intelligence; artificial/computational intelligence paradigms; search, logic and learning algorithms. Machine learning and nature-inspired algorithms – examples, their variants and applications to solving engineering problems; understanding natural languages; knowledge representation, knowledge elicitation, mathematical and logic foundations of AI; expert systems, automated reasoning and pattern recognition; distributed systems; data and information security; intelligent web technologies; convergent technologies – definition, significance and engineering applications. Neural networks and deep learning. Introduction to python AI libraries.

CEE 301 FLUID MECHANICS (3 Units C: LH 30; PH45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. distinguish laminar from transitional and turbulent flows using the concept of Reynolds Number;
2. utilise boundary layer theory to estimate Lift and Drag;
3. derive the distribution of velocity and shear stress in laminar and turbulent flows respectively past flat plates and in circular conduits, and utilisation to obtain total flow, head loss, etc;
4. undertake similitude, development of physical hydraulic models, and scaling of the results from model to prototype;

5. analyse ideal fluid flow into sources from sinks, past circular and ellipsoidal bodies concerning doublets and flow nets;
6. analyse flow in pipes in series, parallel and any network, which may include pumps; and
7. obtain simplified estimates of forces exerted by flow in pipes due to rapid closing or opening of valves, and the use of surge tanks to reduce these forces.

Course Contents

Introduction to incompressible viscous flow, laminar and turbulent flows, Reynolds number; boundary layer flow, lift and drag. Laminar flow – in pipes, between parallel plates. Turbulent flows – along a plate, in ducts and pipes. Physical hydraulic models. Interconnected pipes and pipe network analysis. Potential flows and application to flow nets. steady and unsteady flow in closed conduits; water hammer, surge tanks.

CEE 302: STRENGTH OF STRUCTURAL MATERIALS (2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. utilise bending theory to obtain stress distribution across a bending section, as well as the slope and deflection at a section given any bending moment and shear force distribution along the beam;
2. determine whether a point in a material subjected to multidimensional stress will fail according to any failure theory;
3. explain the concepts of creep, fatigue and their implications in the use of structural materials;
4. analyse motion and stresses in springs;
5. determine the stresses and strains due to internal pressure on thin and thick cylinder walls; and
6. determine the stresses and strains induced in rotating disks and the implications.

Course Contents

Advanced topics on axial, lateral, and torsional loading of shafts and beams; slope and deflection of beams; unsymmetrical bending and shear centre; applications. Springs. Creep, fatigue, fracture and stress concentration. Stresses in thin and thick cylinders, and rotating disks. Multi-dimensional stress systems, Mohr's circle and failure theories.

CEE 303 ENGINEERING GEOLOGY (2 Units C: LH 15; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe the engineering properties of rock and soil materials;
2. identify the geological factors affecting the performance and functioning of a facility on and in the soil and/or rock;
3. conduct engineering geological investigations; and
4. explain the importance of engineering geology-related technical issues during construction.

Course Content

Geology structures and mapping; rocks and minerals; stratigraphy - time scale - fossils and their importance with special reference to Nigeria. Introduction to the geology of Nigeria; engineering applications - water supply, site investigations for dams, dykes and so on.

CEE 305 SOIL MECHANICS I**(3 Units C: LH 30; PH 45)****Learning Outcomes**

Upon the completion of the course, students should be capable of:

1. Measuring soil properties in the laboratory.
2. interpreting and summarising the data;
3. classifying soils;
4. determining the optimum conditions for the compaction of soils and the ultimate amount achievable; and
5. estimating the settlement of soils due to compaction and consolidation.

Course Contents

Mineralogy of soils and soil structures. Formation of soils, soil classification, and engineering properties of soils. Soil in water relationships - void ratio, porosity, specific gravity, permeability and other factors. Atterberg limits, particle size distribution, Shear strength of soils and Mohr's stress circle. Compaction and soil stabilisation, settlement, theory of consolidation. Laboratory work.

WRE 401: Soil Mechanics and Foundation Engineering (2 Units C: LH 45; PH 30)**Learning Outcomes**

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

1. explain the principles of field and laboratory compaction and its application;
2. determine strength properties of soil for engineering applications;
3. determine compressibility and strength properties of soil for design of shallow and deep foundations;
4. identify and calculate the parameters needed for the design of foundations, including footing settlement, end bearing of piles, and earth pressure coefficients; and
5. gain the ability to use modern soil mechanics equipment and soil investigation procedures.

Course Contents

Soil structures, compaction and soil stabilisation, stability of slopes earth pressures, retaining walls. Concepts of permeability, stress distribution, shear strength and pressure in relation to foundation engineering; bearing capacity of soils; shallow and deep foundations, pile foundations; Site Investigation.

CEE 306 DESIGN OF STRUCTURES I**(2 Units C: LH 30)****Learning Outcomes**

Upon completion of the course, students should be capable of:

1. applying fundamental mechanics to the design of reinforced concrete structural elements using elastic design and limit state principles.

Course Contents

Fundamentals of design process, materials selection, building regulations and codes of practice; design philosophy. Elastic design, limit state design, of structural elements in reinforced concrete.

CEE 307 Structural Mechanics I**(2 Units C: LH 30)**

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the concept of statical determinacy of structures;
2. estimate the forces and deflections in statically determinate trusses;
3. estimate the shear forces, bending moments, slopes and deflection in statically determinate beams and portal frames; and
4. derive the influence lines for moving loads on trusses and beams.

Course Contents

Analysis of determinate structures - beams, trusses; structural analysis theorems, graphical methods; application to simple determinate trusses. Influence lines. Williot-Mohr diagram. Deflection of statically determinate structures - unit load, moment-area methods, strain energy methods. Introduction to statically indeterminate structures.

CEE 308 Engineering Surveying and Photogrammetry I (2 Units C: LH 15; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. survey sites using chain surveying and compass;
2. obtain the levels at any location on a site and produce a contour map of the area;
3. conduct a traverse to establish the boundaries of a site; and
4. explain the principles of geodetic levelling and photogrammetry.

Course Contents

Chain surveying. Compass surveying methods. Contours and their uses. Traversing - methods and applications. Levelling - geodetic levelling - errors and their adjustments; applications. Tachometry-methods, substance heighting, self-adjusting and electromagnetic methods. Introduction to photogrammetry.

GET 390 Students Industrial Work Experience II (4 Units C: 12 weeks)

Learning Outcomes

At the end of the SIWES, students should be able to:

1. demonstrate proficiency in at least any three softwares in their chosen career choices;
2. demonstrate proficiency in some animation videos (some of which are free on YouTube) in their chosen careers;
3. carry out outdoor hands-on construction activities to sharpen their skills in their chosen careers;
4. demonstrate proficiency in generating data from laboratory analysis and develop empirical models;
5. demonstrate proficiency in how to write engineering reports from lab work;
6. fill logbooks of all experience gained in their chosen careers; and
7. write a general report at the end of the training.

The experience is to be graded and the students must pass all the modules of the attachment and shall form part of CGPA.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (Students are to proceed on three months of work experience i.e. 12 weeks during the

long vacation following 300 level). Students are engaged in the more advanced workshops, indoor software design training similar to what they will use in the industry and outdoor construction activities to sharpen their skills. The use of relevant animation videos that mimic industrial scenarios is encouraged. Students are to write a report at the end of the training. As much as possible, students should be assisted and encouraged to secure 3 months placement in the industry. Examples of outline of activities and experiences to which students are expected to be exposed to earn prescribed credits include:

Section A: Welding and fabrication processes, automobile repairs, · lathe machine operations: machining and turning of simple machine elements, such as screw threads, bolts, gears, etc. Simple milling machine operations, machine tool maintenance and troubleshooting, and wooden furniture making processes.

Section B: Mechanical design with computer graphics and CAD modelling and drafting. Introduction to Solid works: software capabilities, design methodologies and applications. Basic part modelling: sketching with Solid works, building 3D components, using extruded Bose base · Basic assembly modelling, and solid works drawing drafting. Top-down assembly technique exploded view, exploded line sketch. Introduction to PDMS 3D design software; autoCAD mechanical, SPSS.

A comprehensive case study design project. The student should be introduced to the concept of product/component design and innovation and then be given a comprehensive design project.

Examples of projects should include the following:

- a. design of machine components;
- b. product design and innovation;
- c. part modelling and drafting in solidworks; and
- d. technical report writing.

BU – GST 400 RELIGION AND SOCIAL ETHICS

(3 Units C:LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Identify three (3) interrelatedness between religion and other social institutions;
2. Explain any five (5) effects of social changes on religion and ethics, since the 18th Century;
3. Evaluate any five (5) roles of religion in human and national development;
4. Explain any five (5) biblical approaches in developing a Christian worldview;
5. Illustrate five (5) uniqueness of the Bible in restoring social ethics and values in the society;
6. Demonstrate competence in providing biblical solution in five (5) areas of moral fluidity and/or ethical dilemma in your discipline and the society;
7. Explain any seven (7) biblical principles in personal, family, and/or professional life.

Course Contents

Religion and Society- Definitions. Culture. Traditions. Religions. Religion and Social changes. Role of Religion. Religion and Knowledge. Religion and Morality. Religion and Family Life. Religion and Gender Issues. Religion, Transgender and Homosexuality. Religion and Politics. Religion and Corrupt Practices. Religion and Violence. Religion and Environment. Religion, Food and Diet. Religion and Health. Religion, Education and the Bible. Religion and Business. Religion and Social Order. Religion and Sanctity of Life. Merits and Demerits of Religion. Formation of Christian Worldview. Biblical Principles in Personal, Family, and Professional Life – Theory and Practice.

Minimum Academic Standard

Standard University Library with updated textbooks

BU – GST 440 E-PROJECT MANAGEMENT & SIMULATION (1 Unit C: LH 20, PH 40)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the project management processes
2. discuss the project management knowledge areas
3. demonstrate the formulas, charts, and theories of project management
4. calculate float for complex project network diagrams
5. memorize the formulas for earned value management
6. compare and contrast processes, knowledge areas, theories, and project management best practices

Course Content

Defining Project Management Fundamentals. Initiating the Project. Planning the Project. Preparing to Develop the Project Schedule. Developing the Project Schedule. Planning Project Costs. Planning Human Resources and Quality Management. Communicating During the Project. Planning for Risk. Planning Project Procurements. Planning for Change and Transitions. Executing the Project. Executing the Procurement Plan. Monitoring and Controlling Project Performance. Monitoring and Controlling Project Constraints. Monitoring and Controlling Project Risks. Monitoring and Controlling Procurements. Closing the Project.

Lab Work: Students will undertake the following tasks in the practical classes; work on stakeholders requirements. Create a risk response team. Create a detailed work plan. Develop communication effective plan. Develop both leadership and technical competencies. Monitor and track progress regularly. Look out for potential risks.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement facilities.

GET 402 ENGINEERING PROJECT I

(2 Units C: PH 90)

Leaning Outcomes

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

1. Complete the design phase of a complex engineering problem sourced from industry or community during the SIWES III programme.
2. Demonstrate the connection between engineering product-making and the theoretical courses they have learned following the applicable industry best practices.

Course Contents

In the second semester of the 400-level students, preferably in groups, work from the university on the identified industry or organization to tackle industry complex engineering problems. Theoretical issues may be provided by the department faculty or industry experts. During the vacation, students will now work full time with the organisation/industry on the project as part of the SIWES III. The students can also go beyond the department and engage in multidisciplinary undertakings. Literature survey, review of existing systems etc. must be achieved to a satisfactory extent.

GET 404 ENGINEERING VALUATION AND COSTING

(2 Units C: LH 30)

Leaning Outcomes

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

1. Identify at least three (3) objectives of engineering valuation work, valuer's primary duty and responsibility and valuation terminologies.
2. Describe at least four (4) Valuer's obligation to his or her client, to other valuers, and to the society.
3. Demonstrate with example the engineering valuation methods, valuation standards, and practices.
4. Prepare engineering valuation and appraisal reports and review
5. Discuss expert witnessing and ethics in valuation.
6. Determine price, cost, value, depreciation and obsolescence in real property, personal property, personal property, machinery and equipment, oil, gas, mines, and quarries valuation.

CEE 404 CIVIL ENGINEERING MATERIALS (3 Units C: LH 30; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the suitability of the use of the following as civil engineering materials: concrete, structural steel (and other important structural metals), timber, masonry;
2. conduct tests of engineering properties on civil engineering materials and utilise these for quality control;
3. explain the limitations of these materials under various uses; and
4. characterise variability and uncertainty associated with these materials.

Course Contents

Concrete Technology - types of cements, aggregates and their properties; concrete mix design, properties and their determination. Steel technology – production, fabrication and properties, corrosion and its prevention. Tests on steel and quality control. Timber technology - types of wood, properties, defects, stress grading, preservation and fire protection, timber products. Rubber, plastics, asphalt, tar, glass, lime, bricks and applications to buildings, roads and bridges.

CEE 406: Engineering Surveying and Photogrammetry II (2 Units C: LH 15; PH 45)

Learning Outcomes

Students, upon completion of this course, should be able to:

1. use photogrammetry for surveying;
2. use topographical survey in preparation of contour maps;
3. use contour maps;
4. compute areas and volumes of earthwork; and
5. set out engineering works.

Course Contents

Further work on contours and contouring - methods of contouring, contour interpolation and uses of contour plants and maps, areas and volumes. Setting out of engineering works. Elementary topographical surveying. Elements of Photogrammetry, photogrammetric equipment and errors of measurements.

BU-CEE 401 TRANSPORTATION ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. Relate geometric design from the concept of horizontal alignment and vertical alignments.
2. Analyze the various types of pavements, pavement distresses and performance and factors affecting pavements.

3. Characterize road intersection and understanding various interchanges.
4. Construct different highway information such as traffic rules, freeway and highway safety.
5. Describe the construction and maintenance of drainages, culverts and cross section.
6. Analyze soils in the laboratory experiments for pavement works.

Course Contents

Introduction to Soil Engineering Aspects of Highways. Railways Classification and Design. Airfields Classification and Design. Highway Geometric design. CBR Design of Pavement structure. Interchange design and spacing. Highway information systems. Freeway. Networks and safety. Design of Culverts. Construction and maintenance of culverts. Design of drainage appurtenances. Different cross-sections of roads. Construction equipment types. Pavement Design with Road Note 29. Pavement Design with Road Note 31. Pavement Design with AASHTO. Pavement materials characterization. Laboratory tests on soils for highway construction.

BU-CEE 403 HYDRAULICS

(2 Units C: LH 30)

Learning Outcomes

On successful completion of this course, students will be able to:

1. Identify differences between viscous and turbulent flows in pipes
2. Undertake similitude, development of physical hydraulic models, and scaling of the results from model to prototype
3. Derive the distribution of velocity and shear stress in laminar and turbulent flows respectively past flat plates and in circular conduits, and utilization to obtain total flow, head loss, etc.
4. Identify and analyze the types of losses in closed conduits
5. Analyze flow in pipes in series, parallel and any network, which may include pumps.
6. Obtain simplified estimates of forces exerted by flow in pipes due to rapid closing or opening of valves, and the use of surge tanks to reduce these forces
7. Explain steady and non-uniform flow in open channels
8. Analyze flow in open channels with different empirical formulae
9. Derive the most economical section of different types of channels
10. Identify and analyze hydraulic jump in open channels
11. Understand the concept of sediment transport in river beds

Course Contents

Laminar and turbulent Flows. Boundary layer separation life and Drag. Stream function Velocity potential and application to flow nets. Steady and Unsteady flow in closed conduits. Head loss due to friction bends. Darcy weisbach Formular. Manning. Dimensional Analysis. Hydraulics modelling. Potential flow. Viscous flow. Shear forces in pipes and between parallel plates. Turbulent pipe flow. Flow measurements. Pipe Network Analysis. Reservoir Emptying. Turbo-Machinery. Unsteady flow in pipes. Water hammer. Steady and non-uniform flow in open channels. Gradually varied flow and rapidly varied flow. Flow over movable beds. Sediment Transport. Classification of rivers. River control and Engineering.

BU-CEE 405 HYDROLOGY

(2 Units C: LH 30)

Learning Outcomes

On successful completion of this course students will be able to:

1. Explain the hydrological cycle, its processes such as precipitation, percolation, runoff and transpiration, and related terms such as evaporation, evapotranspiration and infiltration, and perform data analysis
2. Understand the Six (6) factors affecting runoff, rational method and use of flood hydrographs
3. Calculate unit hydrographs for different precipitation durations
4. Become familiar with flood frequency analysis, the probabilistic and deterministic rational methods
5. Understand flood routing and conduct reservoir routing with at least two (2) different routing methods
6. Explain the hydrological cycle and its relation to global hydrological cycle
7. List and describe five (5) properties of aquifers that control the movement and storage of groundwater;
8. Apply Darcy's law for practical situations in groundwater.
9. Differentiate between four (4) types of aquifers (confined, unconfined, leaky and perched aquifers)
10. Explain the mechanics of groundwater flow and the use of flow nets
11. Derive the two (2) equations related to radial flow in wells such the Theim and Theis equations

Course Contents

Laminar and turbulent Flows. Boundary layer separation and Drag. Stream function Velocity potential and application to flow nets. Steady and Unsteady flow in closed conduits, head loss due to friction bends. Darcy-Weisbach, Manning, empirical, general. Dimensional Analysis and hydraulics modelling, Potential flow, viscous flow and shear forces in pipes and between parallel plates. Turbulent pipe flow, Flow measurements. Pipe Network Analysis, Reservoir Emptying. Turbo-Machinery. Unsteady flow in pipes and Water hammer Steady and non-uniform flow in open channels; gradually varied flow and rapidly varied flow. Flow over movable beds. Sediment Transport. classification of rivers. River control and Engineering.

BU-CEE 406 DESIGN OF STRUCTURES II

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. Apply the fundamentals and objective of structural design, code of practice and identify the structural elements found in steel building.
2. Express the theory of structural steel design philosophy and structural properties of steel; and classified beams into different cross-section as specified in table 11, BS 5950.
3. Illustrate lateral torsional buckling effects in beams and available methods.
4. Describe the step-by-step calculations in laterally restrained and unrestrained beam.
6. Illustrate the step-by-step calculations in design of compression members, column design in simple construction, design and detailing of cased column and connect.
7. Explain what retaining walls are, identify different types of retaining walls, and compute the design of retaining walls.

Course Contents

Limit state philosophy and Design in steel. Elastic and Plastic Moment Designs. Design of Structural Elements in steel. Design of Structural Elements in connections and Joints. Properties of timber. Timber preservation. Simple timber design. Limit state philosophy and design in Timber. Elastic methods and Design in Timber. Design of structural elements in Timber and Timber connectors. Laboratory Tests on

Structural elements in Concrete. Laboratory Tests on Structural elements in Timber and Steel. Computer Aided Design of structures. Flexural behaviour of stable beam systems - Determinate and indeterminate systems. Axial stability. Stability of plates. Torsion. Loading and bending. Behaviour of bracing systems Deflection and dynamic behaviour of building systems.

BU – CEE 407 STRUCTURAL MECHANICS II

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the examples of structural elements;
2. estimate the stresses in determinate beams;
3. estimate slopes and deflection in beams and portal frames; and
4. determine stresses in composite beams.

Course Contents

Introduction and Overview. Structural elements. Examples of structural elements. Forces and moments. Free Body Diagrams and Stress Resultants. Members carrying Axial Load. Members carrying Torsion. Stress Resultants in Determinate Beams. Bending of Beams. Euler Beam Theory. Elastic bending stresses. Deflection of Beams. Superposition of Deflection. Geometric Section Properties. Composite Beam Sections. Shear Stresses in Beams. Combined Loading. Stress and Strain Transformation.

BU – CEE 408 WATER & WASTE WATER MANAGEMENT (2 Units C: LH 15, PH 45)

Learning Outcomes

At the end of the course students should be able to:

1. Identify the various sources of water.
2. Estimate water demands for domestic, commercial, industrial, recreational, and agricultural uses.
3. Understand water quality issues and standards.
4. Manage water sampling, surveillance, and analysis.
5. Differentiate water production, pumping, and distribution.
6. Identify sources and causes of wastewater
7. Design wastewater treatment facilities.

Course Contents

Various uses of water. Water demand estimation. Sources of water (stream, lakes, rain, underground) and source selection. Types and design of intakes. Pumping and pump selection. Drinking water qualities and standards (WHO, NWQS, NSO etc.). Water Quality sampling, surveillance, and methods of analysis. Surface water and groundwater pollution (Eutrophication and stream self-purification, Oxygen depletion in streams, Stratification of lakes and reservoirs). Pollution Controls and Water Treatment. Municipal and Rural water supply schemes (from source to distribution). Sources of wastewater. Sewer, sewage, and sewerage. Characteristics and composition of sewage. Wastewater measuring devices: Weirs, Parshall flume, venturi flume. Wastewater Treatments (physical, chemical, biological, phytoremediation). Decentralized/On-site wastewater disposal systems (septic Tanks, sub-surface irrigation/drain fields, VIP, etc.) such as septic tanks. Sewage systems appurtenances (manholes, siphons, etc.).

BU- GEG 403 SYSTEMS DYNAMICS AND SIMULATION

(3 Units C: LH 45)

Learning Outcomes

On the completion of the course, the students should be able to:

1. Explain with five (5) detailed examples the dynamics of a problem.
2. Formulate four (4) hypotheses about systems behaviour.
3. Apply with at least five (5) examples the graphical stock and flow structure and the causal loop diagrams as tools for effective modeling and simulation of dynamic engineering system.
4. Develop three (3) models that reproduce the structure-behaviour a real-life engineering problem using System Dynamics modeling platforms like VENSIM, STELLA, or POWERSIM.
5. Produce one (1) term paper on the functionality, reliability and usefulness of the model after development.

Course Contents

The purpose of modeling. Steps of the modeling process. Problem articulation. Formulating a dynamic hypothesis. Formulating a simulation model. Testing and design policy and evaluation. The concept of feedback. Modeling feedback with causal loop diagrams (CLDs). Simple structures: positive loop, negative loop, coupled loops, loop polarity, and shifts in loop dominance. Stocks and flows. The right level of aggregation. Model formulation (rate equations, auxiliary equations, table functions, levels, and delays). Interactions of the fundamental modes of dynamic behavior (S-shaped growth. S-shaped growth with overshoot, overshoot and collapse, stasis or equilibrium, randomness, chaos). Understanding of the model behavior. System guiding policy analysis. Case studies: modeling the environment, power supply system, water supply system, transportation system, innovation diffusion, growth of new products, urban planning, solid waste, and public health management, renewable energy, automation and control system, mechatronics, robotics, climate change, heating systems, sustainable fuels, etc. Minimum Academic Standards 37 The course is comprised of lectures, seminars, group discussions, students' presentations, modeling sessions and individual assignments/papers. An active participation and overall attendance rate of 80% in scheduled sessions is required, and in the group discussions, students' presentations, and seminars, and is required in those sessions. Simulation Software. VENSIM DSS, STELLA OR POWERSIM.

BU- GEG 404 NUMERICAL METHODS

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course the students should be able to:

1. Solve nonlinear polynomial equations in determining the roots by applying numerical methods such as Bisection, Newton Raphson method, Secant method.
2. Evaluate the Linear Systems of Equations by applying Gaussian Elimination, LU Decomposition, Gaius Seidel Methods
3. Apply Linear, Quadratic and Cubic Langrangian Interpolation Formulae to solve interpolation problems.
4. Solve Linear and Nonlinear Ordinary and Partial Differential Equations by applying Euler method, Runge-Kutta
5. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Difference Method
6. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Volume Method
7. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Element Method Rayleigh Ritz

8. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Galerkin Finite Element Method
9. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Explicit, Semi Implicit and Implicit Finite Volume Method

Course Contents

Numerical Solution to Root Finding of Nonlinear Polynomial Equations – Bisection. Newton Raphson method and Secant method. Linear Systems of Equations – Gaussian Elimination. LU Decomposition and Gaius Seidel Methods. Langrangian Interpolation Formulae – Linear. Quadratic and Cubic. Numerical Solution to Ordinary Differential Equations – Euler method. Runge-Kutta. Numerical Solution to Ordinary Differential Equations Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Ordinary Differential Equations Three Dimensional Problems Using Finite Difference. Numerical Solution to Partial Differential Equations of Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Partial Differential Equations of Three – Dimensional Problems Using Finite Difference Method. Alternating Direct Implicit Three Dimensional Finite Difference Method (FDM). Numerical Solution to 35 Ordinary and Partial Differential Equations Using Finite Elements. Finite Volume Methods: Ritz. Finite Element Methods Rayleigh Ritz. Galerkin Finite Element Method. Explicit, Semi Implicit and Implicit Finite Volume Method.

GET 490 STUDENTS INDUSTRIAL WORK EXPERIENCE III (4 Units C: 24 weeks)

Learning Outcomes

Students on Industrial Work Experience Scheme (SIWES) are expected to:

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 utilise their acquired critical thinking and innate creativity skills, during the program and SIWES Seminar presentation respectively.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (24 weeks from the end of the first semester at 400-Level to the beginning of the first semester of the following session. Thus, the second semester at 400-Level is spent in industry). Each student is expected to work in a programme related industry, research institute or regulatory agencies etc, for a period of 6 months under the guidance of an appropriate personnel in the establishment but supervised by an academic staff of the Department. On completion of the training, the student submits the completed Log book on the experience at the establishment., Also, there will be a comprehensive report covering the whole of the student's industrial training experiences (GET 290, GET 399 and GET 499), on which a seminar will be presented to the Department for overall assessment.

BU – GST 500 SEMINAR ON ADVENTIST HERITAGE (3 Units; C; LH 30; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the four (4) dimensions/emphasis of Adventist education in relation to faith integration in teaching, learning, and life.
2. State at least seven (7) contributions of Ellen White to the Seventh-day Adventist Church
3. Assess five (5) benefits of Literature Ministry in relation to the Seventh-day Adventist Church mission
4. Analyze the meaning and implications of the Three Angels Messages
5. Assess Ellen G. White's counsels in relation any three (3) contemporary issues
6. Evaluate five (5) areas of Ellen White's counsels on Family life
7. Enumerate five (5) major contributions of Health Reforms, Health Institutions, and Medical Ministry to the growth of the Seventh-day Adventist Church
8. Develop at least two (2) community-based projects focused on service to humanity

Course Contents

Philosophy of Adventist Education. Harmonious Development. Biblical Foundation for Faith Integration. The Three Angels Messages. Spirit of Prophecy and Seventh-day Adventist Church. Ellen G. White's Conversion Story. E.G. White's Relationship with Jesus Christ. E.G. White's Writings and Contemporary Issues. Publishing Ministry. Family Life. Child Guidance. Health Ministry in Seventh-day Adventist Church. Health Reforms. Health Institutions. Healthy living. Alternative medicine. Medical Missionary. Health and Community Service. Dynamics of Community-based Projects. Benefits and Assessment of Community-based Projects.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts; Conferences/Unions/Division's Health and Publishing Departments of Seventh-day Adventist Church.

BU – GST 540 INTRODUCTION TO DIGITAL MARKETING (1 Units; C; LH 15; PH 45)

Learning Outcomes

- i. Be able to develop and execute a marketing plan. incorporating all elements of the marketing mix. segmentation and positioning strategies and other elements.
- ii. Have an understanding of the role of both digital and traditional media in marketing. and the intersection of online and offline strategies and tactics.
- iii. Be able to guide the development of a digital presence from a marketing point of view.
- iv. Be proficient in marketing analytics and quantitative evaluation of the marketing environment.
- v. Have working knowledge of website design and development.
- vi. Familiarize oneself with the fundamentals of social media & digital marketing
- vii. Learn how to use existing social & digital marketing tools to achieve marketing and organizational objectives
- viii. Understand the concepts for creating engaging content & drive online campaigns
- ix. Create a framework to audit the current state of the digital assets
- x. Be able to develop and execute a marketing plan. incorporating all elements of the

Course Content

Digital Marketing Strategy: How the Internet works. understanding marketing strategy. the building blocks of marketing strategy. Crafting a digital marketing strategy.

Market Research: The importance of market research. Key concepts in market research. Online research methodologies. Justifying the cost of research.

Content Marketing Strategy: Defining Content marketing. Strategic building blocks. Content creation. Content channel distribution.

User Experience Design: Understanding UX design. Core principles of UX design. Mobile UX. Step-by-step guide to UX design.

Web Development and Design: Web development. Mobile development. Step-by-step guide to building a website.

Writing for Digital: Writing for your audience. Types of web copy. HTML for formatting. SEO copywriting. best practices for online copywriting.

Customer Relationship Management: A CRM model. understanding customers. CRM and data. the benefits of CRM. Social CRM. Step-by-step guide to implementing a CRM strategy.

GET 501 ENGINEERING PROJECT MANAGEMENT (3 Units C: LH 45)

Learning Outcomes

At the end of the course, students should be able to:

1. explain the basics of project management as it relates to the Engineering discipline;
2. demonstrate knowledge and understanding of engineering, management and financial principles and apply these to their own work, as a member and/or leader in a team, to manage projects and in multi-disciplinary environments;
3. conduct, manage and execute projects in multi-disciplinary areas;
4. possess the skills needed for project management; and
5. work within the budget when executing a project for proper management.

Course Contents

Project management fundamentals – definitions, project environment, nature and characteristics, development practice, management by objectives, and the centrality of engineering to projects, infrastructures, national and global development. The scope of project management – organisational, financial, planning and control, personnel management, labour and public relations, wages and salary administration and resource management. Identification of project stakeholders; beneficiaries and impacted persons – functions, roles, responsibilities. Project community relations, communication and change management. Project planning, control and timeliness; decision making, forecasting, scheduling, work breakdown structure (WBS), deliverables and timelines, logical frameworks (log frames), risk analysis, role of subject matter experts (SMEs), role conflicts; Gantt Chart, CPM and PERT. Optimisation, linear programming as an aid to decision making, transport and materials handling. Monitoring and Evaluation – key performance indices (KPIs); methods of economic and technical evaluation. Industrial psychology, ergonomics/human factors and environmental impact considerations in engineering project design and management. Project business case - financial, technical and sustainability considerations. Case studies, site visits and invited industry professional seminars. General principles of management and appraisal techniques. Breakthrough and control management theory; production and maintenance management. Training and manpower development. The manager and policy formulation, objective setting, planning, organising and controlling, motivation and appraisal of results.

GET 502 ENGINEERING LAW (2 Units C: LH 30)

Learning Outcomes

Students will be able to:

1. Describe and explain the basic concept, sources and aspects of law;
2. Describe and explain the major differences between the various categories of law, courts and legal jurisdictions;
3. Describe and explain legal principles and their application in professional engineering design and management services and their professional liability implications; and
4. Develop reasoned analysis of real-life or hypothetical engineering scenarios using the legal principles undertake critical analysis of reliable information to develop, and practically present technical reports for use in varying judicial/quasi-judicial settings including as an expert witness.

Course Contents

Common Law: its history, definition, nature and division. Legislation, codification interpretation. Equity: definition and its main spheres. Law of contracts for Engineers: Forms of contract and criteria for selecting contractors; offer, acceptance, communication termination of contract. Terms of Contracts; suppliers' duties – Damages and other Remedies. Termination/cancellation of contract Liquidation and Penalties; exemption clauses, safety and risk. Health and Safety. Duties of employers towards their employees. Duties imposed on employees. Fire precautions act. Design for safety. General principles of criminal law. Law of torts: definition, classification and liabilities. Patents: requirements, application, and infringement. Registered designs: application, requirements, types and infringement. Company law. Labour law and Industrial Law. Business registration.

CEE 506 CONSTRUCTION ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

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

1. plan construction activities incorporating the most appropriate combination of equipment and manpower;
2. manage construction to achieve quality construction at minimum cost and in least time; and
3. procure appropriate finance and insurance for construction projects at the least cost for the expected benefit.

Course Contents

Construction practices and professional relations. Earth-works. Construction equipment and techniques. Form-work design, component assembly. Improvement of productivity and construction practices. Safety. Capital outlay and operating cost, project financing, insurance and bonding, contract terms. Solutions to job site and engineering problems in buildings and heavy construction in Nigeria.

BU-CEE 501 BUILDING SERVICES ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. understand the Engineering study of the materials and equipment used in mechanical and electrical services of buildings.
2. Design of building services components; modern building operation; selection of necessary equipment. Specific topics like illumination of building, comfort, heat loss and heat gain, air conditioning and climate control, water supply and fire protection.
3. Design drainage systems, plumbing and sewage disposal, elevators, escalators, building acoustics.

Course Contents

Engineering study of the materials and equipment used in mechanical and electrical services of buildings. Design of building services components; modern building operation; selection of necessary equipment. Specific topics like illumination of building, comfort, heat loss and heat gain, air conditioning and climate control, water supply and fire protection. Drainage systems, plumbing and sewage disposal, elevators, escalators, building acoustics.

BU-CEE 502 WASTE TO WEALTH CIRCULAR ECONOMY (3 Units; C: LH 30; PH 45)

Learning Outcomes

At the end of the course students should be able to:

1. Identify at least three of the agricultural wastes are predominant in Ilishan
2. Characterize solid wastes
3. Understand practically the different methods of treating solid wastes
4. Manage solid waste successfully
5. Calcine the agricultural waste into ashes
6. Use different agricultural wastes ashes to supplement cement
7. Produce cement-binder concrete for testing and application
8. Test fresh and harden concrete for its properties
9. Organize secondary school students and colleagues to manage solid waste in their environment
10. Mobilize the community on ways and means of ensuring a clean environment

Course Contents

Agricultural products in Ilishan Remo. Solid waste characteristics. Greenhouse gases and its effect on the climate. Solid waste Generation. Solid waste Collection and transportation. Solid waste treatment and disposal. Circular Economy. Waste minimization techniques. Calcination. Test for Pozollants. Particle size analysis. Design of concrete mixes. Tests for concrete workability. Test for concrete compressive strength. Environmental awareness. Formation of EcoVanguard Club in schools. Location base case study.

BU-CEE 503: CIVIL ENGINEERING PRACTICE (3 Units C: LH 30; PH 90)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe standard methods of measurement as related to civil engineering works;
2. estimate various materials used in civil engineering works;
3. prepare of Bill of Engineering Measurement and Evaluation (BEME);
4. understand contracts and subcontracts for civil engineering works;
5. understand tendering process and selection procedures;
6. understand Public Procurement Act;
7. understand job planning and control – programme;
8. prepare progress reports and certificates.

Course Contents

Civil Engineering Work Standards and measurements. Contracts and subcontracts. Preparation of Bill of Engineering Measurement and Evaluation (BEME). Works construction and supervision. Job planning and control – Programme Charts – Bar charts. Critical path methods, network method etc. Construction machinery and equipment. Applications/Case study-dams, foundations, bridges, highways, industrial buildings, sewage works

BU-CEE 505: TUNNEL ENGINEERING

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe the criteria for tunnel consideration
2. identify different types of tunnels;
3. understand stability, support and deformation of tunnels;
4. discuss challenges encountered in tunneling and ground behaviour;
5. identify sustainability in tunneling;
6. understand risk aspect in tunneling;
7. prepare cost and time plans for tunnels.

Course Contents

Definition and shape of Tunnel. Criteria of Tunnel Consideration. Type of Tunnels. Tunnel Lining. Principles and Analysis for Earth and Rock Tunnels. Tunnel Materials. Tunnel Construction Engineering. Rock Tunnelling. Soft-ground Tunnelling. Stability and Support Systems. Deformations of Tunnels. Performance of Tunnels. Problems in tunneling and ground behaviour. Ground water problem in tunnelling. Water ingress and Grouting. Tunnel cost and time planning. Risk aspects in tunnelling. Sustainability in tunnelling.

CEE 599 PROJECT

(6 Units C: PH 270)

Learning Outcomes

Upon completion of this course, students should be able to:

1. initiate worthwhile projects of a research or professional nature;
2. analyse the project problem and develop creative proposals for the solution;
3. execute the proposal for the solution to the problem; and
4. clearly and persuasively communicate solutions orally and in writing

Course Contents

For proper guidance of the students, projects will depend on the available academic staff expertise and interest but the projects should be preferably of investigatory nature. Preferably, students should be advised to choose projects in the same area as their option subjects.

BU-CEE 511 STRUCTURAL DESIGN

(2 Units E: LH 30)

Learning Outcomes

At the end of this course students should be able to:

1. Analyse structures to be designed
2. Learn the philosophies of design
3. Design of structural elements
4. Learn matrix and other methods of structural analysis
5. Design simple beams
6. Evaluate structural members in compression and tension

Course Contents

Introduction. Structural design process. Philosophy of designing. Design of members in direct tension and compression. Plastic methods of structural analysis. Matrix method of structural analysis. Elastic instability. Continuum of plain strain. Elastic flat plates. Torsion. Solution by series. Finite difference. Finite element methods. Yield line analysis. Strip methods for slabs. Design of simple beams. Design of composite beams. Design of members in direct tension and compression. Column. Trusses. Frames.

BU-CEE 512 ADVANCED STRUCTURAL ANALYSIS

(2 Units E: LH 30)

Learning Outcomes

At the end of this course students should be able to:

1. Analyse structures
2. Classify structure
3. Analyse beams and structures
4. Differentiate between statically determinate and indeterminate structures
5. Apply influence lines methods
6. Evaluate the plastic behaviours of structures

Course Contents

Kinematical Analysis of Structures. Classification of Structures. Degrees of Freedom. General Theory and Analytical Method for Construction of Influence Lines. Multispan Beams and Trusses. The Generation of Statically Determinate Trusses. Three-Hinged Arches. Cables. Deflections of Elastic Structures. Statically Indeterminate Structures. The Force Method. Cables. Deflection of Static Structures. Statically Indeterminate Structures. The Force Method, The Displacement Method. Mixed Method, Influence Lines Method. Matrix Stiffness Method. Plastic Behavior of Structures. Stability of Elastic Systems. Dynamics of Elastic Systems.

BU-CEE 521 WATER RESOURCES ENGINEERING (2 Units E: LH 15; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. understand water supply and treatment;
2. design water treatment plant;
3. know the process of waste water collection, treatment and disposal;
4. design waste water collection and treatment plant;
5. understand the methods of solid waste collection, treatment and disposal and design of systems;
6. design solid waste collection, treatment and disposal systems;
7. understand air pollution and control;
8. work in teams to perform experimental tasks; and
9. prepare and present practical reports.

Course Contents

The hydraulics of open channels and wells, drainage, hydrograph analysis, reservoir and flooding routing, hydrological forecasting, hydraulic structures e.g. dams, dykes, levees, weirs, docks and harbours,

spillways, silting basins, manholes, and coastal hydraulic structures, etc., engineering economy in water resources planning. Application of principle of hydraulic and hydrology to problems in the control, conservation and usage of water, flood control, water supply, irrigation, navigation, and river basic planning. Basic concepts of systems and economic analysis as applied to water resources.

BU-CEE 522 ENVIRONMENTAL ENGINEERING (2 Units E: LH 15; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. understand the Theory and laboratory evaluation for the design, unit operation and processing of water and waste water, biological water, chemical water: collection, treatment, disposal and design.
2. Application of basic principles of sanitary engineering and hydraulics to the design of water distribution systems.
3. understand Air pollution and control, incinerators, solid waste and landfills.
4. be able to collect, treat and dispose water.
5. treat, design, and distribute water system.
6. apply basic principle for sanitary engineering

Course Contents

Theory and laboratory evaluation for the design and operation of unit operation and processes in water and wastewater, biological water, chemical water: collection, treatment, disposal and design. Application of basic principles of sanitary engineering and hydraulics to the design of water distribution systems. Air pollution and control, incinerators, solid waste and landfills.

BU-CEE 531 GEOTECHNICAL ENGINEERING (2 Units E: LH 15; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. understand stresses in soil.
2. determine the consolidation and shear strength of soils.
3. carry out site investigations.
4. be able to collect, treat and dispose water.
5. determine bearing capacity of soil.
6. understand the intricacies of foundations

Course Contents

Stresses in soils. Consolidation and settlement. Shear strength of soils. Barth pressures. Bearing capacity of soils. Foundations: normal and deep foundations. Slope stability. Site investigations. In the teaching of teaching of this core course. Attempts will be made to integrate the biblical teaching in the science of the subjects for wholistic development of the society.

BU-CEE 532 FOUNDATION ENGINEERING (2 Units E: LH 15; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. carry out site investigation.
2. carry out measurements both in the laboratory and on the site.
3. understand the engineering properties of different types of soil.
4. Design different foundation types.
5. treat soil for engineering applications.

Course Contents

Site investigation. Field and laboratory measurement. Engineering properties of “soils” for design. Plastic equilibrium theory. Design of footings, and rate, differential settlement, earth structures evaluation, shallow and deep foundations. Single piles. Group action. Cofferdams. Bracing and strutting techniques. In-situ testing. In the teaching of this course, attempts shall be made to integrate the biblical teaching in the science of the subjects for wholistic development of the society.

BU-CEE 541 HIGHWAY AND TRAFFIC ENGINEERING

(2 Units E: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. plan and carry out traffic survey;
2. evaluate pavement design;
3. understand road construction and maintenance;
4. understand road standards, financing and administration;
5. understand the methods of solid waste collection, treatment and disposal and design of systems;
6. design solid waste collection, treatment and disposal systems;
7. determine the capacity and level of service of the roadway and railway
8. work on traffic control scheme, plan and manage roads, waterways, runways and railways;
9. design traffic signal.
10. identify suitable road construction materials

Course Contents

Highway planning and traffic surveys. Road pavement characteristics. Simple design method. Construction and maintenance of roads including labour-based methods. Study of Nigerian highways design policies, standard and specifications. Comparisons with international standards, administration and finance. Condition of all transportation media. Roads and Railways traffic analysis and design, including definition and determination of level of service and capacity for different types of roads and railways. Design of traffic control schemes. Traffic management and design of traffic signals. Parking: geometries design, construction methods, construction materials and laboratory tests.

BU-CEE 542 URBAN TRANSPORTATION

(2 Units E: LH 30)

Learning Outcomes

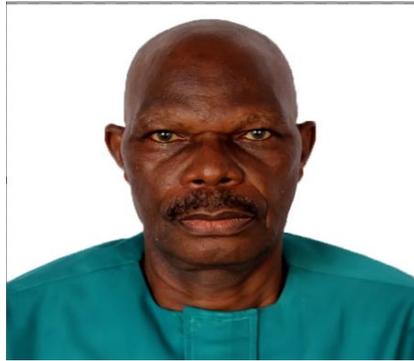
At the end of the course, students should be able to:

1. explain the application of operations research and systems analysis techniques to transportation system (passenger and freight);
2. critically evaluate Network flows; Routing and Scheduling, Technology Selection, Terminal operation.;
3. evaluate the techniques for design of transportation systems, including Networks of fixed facilities and route networks’ Time-saving improvements.
4. Evaluate the use of low-capital cost options and the role of demonstration projects in engineering.
5. Evaluation of alternate designs

Course Contents

Application of operations research and systems analysis techniques to transportation system (passenger and freight). Network flows. Routing and Scheduling. Technology Selection. Terminal operation. Techniques for design of transportation systems, including Networks of fixed facilities and route networks. Time-saving improvements. Use of low-capital cost options and the role of demonstration projects. Evaluation of alternate designs.

DEPARTMENT OF COMPUTER ENGINEERING



Engr. Samson OGUNLERE, PhD.
Head of Department

BACHELOR OF COMPUTER ENGINEERING (B.ENG.)

Overview

The Department of Computer Engineering offers a fast growing trend in both research, innovation and applications of Engineering from the perspective of computer hardware and software demands. Computer Engineering programme is highly market driven, and research based with a well-defined focus on providing solutions to contemporary problems in both industry and academia. The department offers a Bachelor of Computer Engineering (B.ENG) to fulfil these noble goals. The aim of the programme is to equip its students with the knowledge and skill necessary to fulfil organizational needs of computer engineering-based systems to produce graduates who can work in companies that develop hardware components, new communication systems and software. Computer Engineers use principles from Computer Science and Electrical Electronics Engineering to create hardware (physical components) and firmware which are used in a wide range of areas: consumer electronics, medical devices, communication systems, aircraft, self-driving cars, automotive, etc. Computer engineers can grow into leadership positions, pursue research or graduate studies in the field, upon graduation.

Philosophy

The philosophy of the programme deals with the fundamental concepts and assumptions in the theory of computational systems, algorithm, computational complexity, data, information and data representation by focusing on problems associated with their specification, programming, implementation, verification and testing. These skills as related to high-level languages and complex programs are to imparted in the students to prepare them for self-employment, employment in both public and private sector in solving mankind problems.

Objectives

- i. To prepare an engineer to work with both software and hardware aspects of computers.
- ii. To produce graduates who can work in companies that develop hardware components, new communication systems and software.
- iii. To provide students with necessary tools with science and technological background and polish them in specific area of computer engineering in the graduating year.
- iv. To equip students with necessary workshop practices for the technological know-how.

Vision Statement

To develop the department into advance center of learning by synergizing teaching, learning and research in order to produce competent computer engineers with an exposure to inter-disciplinary engineering knowledge such as Cyberpreneurship and Cyberlaw, Robotics and Automation and lots more.

Mission Statement

To impart quantitative and qualitative technical education in producing effective and efficient computer engineers who can compete at global level I innovative and solving computer related issues.

Primary Areas of Specialization

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).

ADMISSION REQUIREMENTS

Candidates are admitted into the degree programme in any 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 five year degree programme, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy all the following conditions –

- a. A minimum of Credit level (C6) pass in at least 5 subjects, including English Language; Mathematics, Physics, Chemistry and any other acceptable science subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.

It is also desirable for candidates to have Further Mathematics and Technical Drawing at credit levels. This will be an added advantage.

- b. Acceptable score in the Unified Tertiary Matriculation Examinations (UTME). The subjects shall be Mathematics, Physics, Chemistry and English Language.

- c. In addition, candidates with acceptable Unified Tertiary Matriculations Examinations (UTME) results will further be screened to ascertain suitability for admission into Babcock University.

Direct Entry Mode

For four year Direct Entry, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy the following three conditions –

- a. Candidates must satisfy the 5 credits ‘O’ Level requirements in English Language; Mathematics, Physics, Chemistry and any other one relevant subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.
- b. 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 through Direct Entry. Candidates who have good National Diploma (ND) result, minimum of Upper Credit in relevant Engineering Technology programmes from recognized institution may also be considered for admission into 200 level.
- c. Direct entry candidates must also satisfy the UTME requirements.

COURSE DURATION

This undergraduate programme will runs for 10 semesters (5 academic sessions) for full time and 8 semesters (4 academic sessions) for Direct Entry students.

GRADUATION REQUIREMENTS

The following regulations shall govern the conditions for the award of a honours degree in Engineering and Technology:

1. candidates admitted through the UTME mode shall have registered for a minimum of 150 and maximum of 180 units of courses during the 5–year engineering degree programme. Such candidates shall have spent a minimum of ten academic semesters;
2. candidates admitted through the Direct Entry mode shall have registered for a minimum of 120 and a maximum of 150 units of courses during a 4–year engineering degree programme. Such candidates shall have spent a minimum of eight academic semesters;
3. candidates admitted through the Direct Entry mode at 300-Level shall have registered for a minimum of 90 and a maximum of 120 units of courses during a 3–year engineering degree programme. Such candidates shall have spent a minimum of 6 academic semesters;
4. The minimum and maximum credit load per semester is 16 and 24 credit units respectively; a student shall have completed and passed all the Courses registered for, including all compulsory courses and such elective /optional courses as may be specified by the university/faculty or department; obtained a minimum Cumulative Grade Point Average (CGPA) specified by the university but not less than 2.00; and
5. a student shall also have earned the 11 credit units of Students Industrial Work Experience Scheme (SIWES), 8 credit units of University General Study courses and four credit units of Entrepreneurship courses.

GLOBAL COURSE STRUCTURE

LEVEL	GST/ENT	BASIC SCIENCE	DISCIPLINE GET/GEG	DEPARTMENTAL COURSES (CPE)	SIWES	TOTAL
100	11	19	3	4	-	37
200	11	-	22	2	3	38
300	9	-	24	7	4	44
400	4	-	10	19	4	37
500	4	-	5	29	-	38
TOTAL	39	19	64	61	11	194

LEVEL	1 ST SEMESTER	2 ND SEMESTER	TOTAL
100	17	20	37
200	21	17	38
300	21	23	44
400	21	16	37
500	19	19	38
TOTAL	99	95	194

BACHELOR OF COMPUTER ENGINEERING (B.ENG.)**100 LEVEL COURSES**

COURSE CODE	COURSE TITLE	STATUS	SEMESTER	
			Core/Elective	1ST
GST 001.002	Citizenship Orientation	C	0	0
GST 111	Communication in English	C	2	-
GST 112	Nigerian Peoples and Culture	C	-	2
BU – GST 105	Use of Library and Study Skills	C	2	-
BU – GST 112	Health Principles	C	-	1
BU – GST 120	ICT Fundamentals and Office Productivity Management	C	1	-
BU – GST 126	Life and Teachings of Christ the Messiah	C	-	3
MTH 101	Elementary Mathematics I	C	2	-
MTH 102	Elementary Mathematics II	C	-	2
MTH 103	Elementary Mathematics III	C	2	-
PHY 101	General Physics I	C	2	-
PHY 102	General Physics II	C	-	2
PHY 103	General Physics III	C	2	-
PHY 104	General Physics IV	C	-	2
PHY 107	General Practical Physics I	C	1	-
PHY 108	General Practical Physics II	C	-	1
STA 112	Probability I	C	-	3
GET 101	Engineer in Society	C	1	-
GET 102	Engineering Graphics and Solid Modelling I	C	-	2
CPE 112	Introduction to Computer Engineering	C	-	2
BU – CPE 101	Computer Programming for Engineers	C	2	-
	TOTAL (37 Credits)		17	20

BACHELOR OF COMPUTER ENGINEERING (B.ENG.)

200 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS	SEMESTER	
			Core/Elective	1 ST
GST 001.002	Citizenship Orientation	C	0	0
ENT 211	Entrepreneurship and Innovation	C	2	-
GST 212	Philosophy, Logic and Human Existence	C	-	2
BU – GST 200	Communication in French	C	-	1
BU – GST 215	Adventist Heritage	C	3	-
BU – GST 220	Origin of Science	C	-	1
BU – GST 221	Introduction to Agriculture	C	1	-
BU – GST 290	Introduction to Data Analytics	C	1	-
GET 201	Applied Electricity I	C	3	-
GET 202	Engineering Materials	C	-	3
GET 203	Engineering Graphics and Solid Modeling II	C	2	-
GET 204	Student Workshop Practice	C	-	2
GET 207	Applied Mechanics	C	3	-
GET 209	Engineering Mathematics I	C	3	-
GET 210	Engineering Mathematics II	C	-	3
GET 211	Computing and Software Engineering	C	3	-
BU – CPE 202	Innovative Technologies and Emerging Trends	C	-	2
*GET 290	SIWES I	C	-	3
TOTAL (38 Credits)			21	17

NOTE:

*GET 290 – Student Work Experience Scheme – 9 Weeks

BACHELOR OF COMPUTER ENGINEERING (B.ENG.)

300 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS	SEMESTER	
			Core/Elective	1 ST
GST 001.002	Citizenship Orientation	C	0	0
ENT 312	Venture Creation	C	-	2
GST 312	Peace and Conflict Resolution	C	-	2
BU – GST 310	Data Analysis using Advanced Excel SPSS Power BI Tableau	C	1	-
BU – GST 317	Fundamentals of Christian Faith	C	3	-
BU – GST 312	Family Life	C	-	1
GET 301	Engineering Mathematics III	C	3	-
GET 302	Engineering Mathematics IV	C	-	3
GET 304	Engineering Communication, Technical Writing and Presentation	C	-	3
GET 305	Engineering Statistics and Data Analytics	C	3	-
GET 306	Renewable Energy System and Technology	C	-	3
CPE 301	Computer Organization and Architecture	C	2	-
CPE 302	Measurement and Instrumentation	C	-	3
TEL 305	Electrical Machines	C	3	-
EEE 311	Electric Circuit Theory I	C	2	-
EEE 321	Analogue Electronic Circuit	C	2	-
EEE 322	Digital Electronic Circuit	C	-	2
BU – CPE 303	Electromagnetic Field and Waves	C	2	-
*GET 390	SIWES II	C	-	4
	TOTAL (44 Credits)		21	23

NOTE:

*GET 390 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF COMPUTER ENGINEERING (B.ENG.)**400 LEVEL COURSES**

COURSE CODE	COURSE TITLE	STATUS	SEMESTER	
			1ST	2ND
		Core/Elective		
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 400	Religious and Social Ethics	C	3	-
BU – GST 440	E-Project Management and Simulation	C	1	-
GET 402	Engineering Project I	C	-	2
*GET 404	Engineering Valuation and Costing	C	-	2
CPE 401	Microprocessor and Embedded System	C	3	-
CPE 403	Control System	C	2	-
CPE 405	Fundamentals of Software Engineering	C	2	-
CPE 411	Hardware Design Techniques and verification	C	2	-
CPE 413	Research Methods	C	2	-
BU – CPE 402	Prototyping Techniques	C	-	2
BU – CPE 406	Introduction to Artificial Intelligence	C	-	3
BU – CPE 407	Data Communication and Networks	C	3	-
BU – GEG 403	Systems Dynamics and Simulation	C	3	-
BU – GEG 404	Numerical Methods	C	-	3
*GET 490	SIWES III	C	-	4
	TOTAL (37 Credits)		21	16

NOTE:

*GET 404 – Engineering Valuation and Costing – 6 Weeks

*GET 490 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF COMPUTER ENGINEERING (B.ENG.)

500 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS	SEMESTER	
			Core/Elective	1 ST
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 500	Seminar on Adventist Heritage	C	-	3
BU – GST 540	Introduction to Digital Marketing	C	1	-
GET 501	Engineering Project Management	C	3	-
GET 502	Engineering Law	C	-	2
CPE 501	Testing, Reliability and Maintainability	C	2	-
CPE 502	Digital Signal Processing	C	-	3
CPE 511	Machine Learning and Applications	C	3	-
BU – CPE 500	Operating Systems	C	2	-
BU – CPE 502	Computer Graphics and Animation	C	-	3
BU – CPE 503	Computer Security Techniques	C	2	-
BU – CPE 505	Cyberpreneurship & Cyber law	C	2	-
BU – CPE 507	Fundamentals of Internet of Internet Of Things (Iot)	C	2	-
CPE 590	Final Year Project	C	-	6
CPE 505	Digital System Design with VHDL	E	2	-
CPE 514	Professional Practice and Ethics	E	-	2
BU – CPE 511	Robotic & Automation	E	2	
BU – CPE 512	Design & Installation of Electrical & ICT Services	E	-	2
	TOTAL (38 Credits)		19	19

Note – the students are to register for one elective in first semester and one elective in second semester.

**B. Eng. COMPUTER ENGINEERING
COURSE DESCRIPTIONS**

GST 001,002 CITIZENSHIP ORIENTATION

0, 0

These are non-credit, but mandatory seminars where students are mentored in all aspects of Christian life. It discusses many topics with the hope of modeling best moral practices on students. Students received either a satisfactory or unsatisfactory grade at the end of the semester.

GST 111 COMMUNICATION IN ENGLISH

(2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Identify possible sound patterns in English Language;
2. List notable language skills;
3. Classify word formation processes;
4. Construct simple and fairly complex sentences in English;
5. Apply logical and critical reasoning skills for meaningful presentations;
6. Demonstrate an appreciable level of the art of public speaking and listening; and
7. Write simple and technical reports.

Course Contents

Sounds and sound patterns in English Language (vowels and consonants, phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). major word formation processes; the sentence in English (types: structural and functional). grammar and usage (tense, concord and modality). Reading and types of reading, comprehension skills, 3RsQ. Logical and critical thinking; reasoning methods (logic and syllogism, inductive and deductive argument, analogy, generalization and explanations). Ethical considerations, copyright rules and infringements. Writing activities (pre-writing (brainstorming and outlining). writing (paragraphing, punctuation and expression). post- writing (editing and proofreading). Types of writing (summary, essays, letter, curriculum vitae, report writing, note-making). Mechanics of writing. Information and Communication Technology in modern language learning. Language skills for effective communication. The art of public speaking.

GST 112 NIGERIAN PEOPLES AND CULTURE

(2 Units C: LH 30)

Learning Outcomes

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

1. Analyze the historical foundation of Nigerian cultures and arts in pre-colonial times;
2. Identify and list the major linguistic groups in Nigeria;
3. Explain the gradual evolution of Nigeria as a political entity;
4. Analyze the concepts of trade and economic self-reliance of Nigerian peoples in relation to national development;
5. Enumerate the challenges of the Nigerian state regarding nation building;
6. Analyze the role of the judiciary in upholding fundamental human rights
7. Identify the acceptable norms and values of the major ethnic groups in Nigeria; and
8. List possible solutions to identifiable Nigerian environmental, moral and value problems.

Course Contents

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and cultures; peoples and cultures of the minority ethnic groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concepts of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigerian peoples; trade, skill acquisition and self-reliance). Social justice and national development (definition and classification of law); Judiciary and fundamental rights. Individuals, norms and values (basic Nigerian norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts [Cultism, kidnapping and other related social vices]). Re-orientation, moral and national values (The 3Rs – Reconstruction, Rehabilitation and Re-orientation; re-orientation strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

BU – GST 105 USE OF LIBRARY AND STUDY SKILLS (2 Units: C: LH 30)

Learning Outcomes

Upon completion of this course, students would have learnt to:

1. Explain the origin of three writing materials from the ancient to information age
2. Explain four types of libraries
3. Explain six importance of libraries in the educational and learning process
4. Explain five importance of Libraries and Information in the Educational and Learning Process
5. Discuss five Sections in the Library and functions performed
6. Explain two Classification Scheme & Library Catalogues
7. Explain four Information Search Tools
8. State four social issues relating to Libraries and rules for users
9. Explain two reference styles

Course Contents

Ancient period to Information age. Evolution of writing Materials. Concept of library. Types of library and information centers. Sections in the library. Parts of book. Electronic Information Resources. Bibliographic entries. Bibliographic control. Library Catalogue. Filing Shelving. Shelve reading. Library automation. Library software applications. Information networking and sharing. How to study. The brain. Memory retention mechanism. Search tools. Information retrieval tools. Reference styles. Social issues relating to Libraries and Information centers. Preparation for academic success.

Minimum Academic Standard

Library

BU – GST 112 HEALTH PRINCIPLES (1 Unit: C: LH 15)

Learning Outcomes

On completion of the course, students should be able to:

1. Define health according to World Health Organisation
2. State five (5) components and the human body and their function

3. Describe at least three (3) determinants of health and well-being
4. List five (5) factors that mental health
5. Explain two (2) current health trends

Course Contents

Meaning of health. Ecology of human disease. Biblical foundation health. Determinants of health. Basic human anatomy and physiology. Body defense mechanism. Element of nutrition. Health implication of nutrition for health. Personal and environment hygiene. Environmental pollution. Substance Abuse. Health implication of substance abuse. Mental health and well- being. Stress coping mechanism. Body pH and Health. Current trends in Health. Sport health and physical activity.

Minimum Academic Standards

Nil

BU – GST 120 ICT FUNDAMENTALS & OFFICE PRODUCTIVITY MANAGEMENT

(1 Unit: C: LH 15, PH 45)

Learning Outcome

On completion of the course, students should be able to:

Word:

- i. creating text documents
- ii. editing and formatting the existing documents
- iii. making a text document interactive with different features and tools
- iv. graphical documents, comprising images
- v. used by Authors and Researchers
- vi. detect grammatical errors in a text document.

Excel:

- viii. perform data entry and storage
- i. collection and Verification of business data
- ii. administrative and managerial duties
- iii. accounting and budgeting
- iv. data Analysis
- v. reporting + Visualizations
- vi. forecasting.

PowerPoint:

- i. create presentations from scratch or a template
- ii. add text, images, art, and videos
- iii. select a professional design with PowerPoint Designer.

COURSE CONTENT

Word:

Getting started with word. Adding tables. Controlling page appearance. Formatting text and paragraphs. Inserting graphic objects. Managing lists. Preparing to publish. Working more efficiently. Controlling the follow of a document. Customizing formats using styles and themes. Inserting content using quick parts.

Organizing content using tables and charts. Simplifying and managing long documents. Using mail merge. Using templates to automate document formatting.

PowerPoint:

Getting started with PowerPoint. Preparing a PowerPoint presentation. Performing advanced text editing operations. Adding graphical elements to your presentation. Modifying objects in your presentation. Adding tables to your presentation. Adding charts to your presentation. Preparing to deliver your presentation. Adding SmartArt math equations to a presentation. Collaborating on a presentation. Customizing a slide show. Customizing design templates. Modifying the PowerPoint environment. Securing and distributing a presentation. Working with media and animations.

Excel:

Getting started with excel. Formatting a worksheet. Managing workbooks. Modifying a worksheet. Performing calculations. Printing workbooks.

Lab Work: Students will undertake the following tasks in the practical classes; Learn how to use Microsoft Word to create resumes, reports, and write letters & as a simple text editor.

Learn how to use MS Excel in business analysis, managing lists of people, operations management, and performance reporting & for office administration, project management, and managing programs, contracts and accounts.

Learn how to use PowerPoint to create a slideshow of valuable information through charts, and images for a presentation.

Minimum Academic Standard: Computer studio and simulation Laboratory with NUC-MAS requirement facilities.

BU – GST 126 LIFE AND TEACHINGS OF CHRIST THE MESSIAH (3 Units: C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the historicity of Jesus Christ, using at least five (5) biblical and extant literature;
2. Explore five (5) religio-political and socio-economic events in Palestine during Jesus' time.
3. Enumerate five (5) evidences that Jesus Christ came at the fullness of time;
4. Identify at least three (3) theological implications of the Incarnation;
5. Contrast between Jewish and Jesus' views of the Kingdom;
6. Enumerate any seven (7) teachings of Jesus Christ;
7. Describe any five (5) events leading to Jesus' arrest and crucifixion;
8. Enumerate any five (5) theological implications of Jesus' death and resurrection;

Course Contents

The world which Jesus met and worked in. God with Us. Historicity of Jesus Christ. The fullness of Time. Childhood and Youth of Jesus. The Baptism of Jesus. The temptation of Jesus. The Gospel of the kingdom. The Ministry Jesus Christ. The Mission of Jesus Christ. Jesus' Teaching Methods. The Sermon on the Mount. The last days of Christ earthly life. Gethsemane Experience. Jesus' Arrest. Judgement of Jesus. The Crucifixion. Burial and Resurrection. Jesus' Appearances. Theological implications of Jesus Resurrection and teachings.

Minimum Academic Standards

Standard University Library

MTH 101 ELEMENTARY MATHEMATICS I (Algebra and Trigonometry)
(2 Units C: LH 30)

Learning Outcomes

At the end of the course students should be able to:

1. Define and explain set, subset, union, intersection, complements, and demonstrate the use of Venn diagrams;
2. Solve quadratic equations;
3. Solve trigonometric functions;
4. Identify various types of numbers; and
5. Solve some problems using binomial theorem.

Course Contents

Elementary set theory, subsets, union, intersection, complements, 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 of any magnitude, addition and factor formulae.

MTH 102 ELEMENTARY MATHEMATICS II (Calculus) **(2 Units C: LH 30)**

Learning Outcomes

At the end of the course, students should be able to:

1. Identify the types of rules in differentiation and integration;
2. Recognise and understand the meaning of function of a real variable, graphs, limits and continuity;
3. Solve some applications of definite integrals in areas and volumes;
4. Solve function of a real variable, plot relevant graphs, identify limits and idea of continuity;
5. Identify the derivative as limit of rate of change;
6. Identify techniques of differentiation and perform extreme curve sketching;
7. Identify integration as an inverse of differentiation;
8. Identify methods of integration and definite integrals; and
9. Perform integration application to areas, volumes.

Course Contents

Functions of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation, maxima and minima. Extreme curve sketching, integration, definite integrals, reduction formulae, application to areas, volumes (including approximate integration: Trapezium and Simpson's rule).

MTH 103 ELEMENTARY MATHEMATICS III (Vectors, Geometry and Dynamics)
(2 Units C: LH 30)

Learning Outcomes:

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

1. solve some vectors in addition and multiplication.
2. calculate force and momentum.
3. solve differentiation and integration of vectors.
4. analyse kinematics of a particle.

Course Contents

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, scalar, multiplication of vectors, linear independence. Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normals. Kinematics of a particle. Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion under gravity, projectiles and resisted vertical motion. Elastic string and simple pendulum. Impulse, impact of two smooth spheres and a sphere on a smooth surface.

PHY 101 GENERAL PHYSICS I (Mechanics)

(2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Identify and deduce the physical quantities and their units;
2. Differentiate between vectors and scalars;
3. Describe and evaluate motion of systems on the basis of the fundamental laws of mechanics;
4. Apply Newton's laws to describe and solve simple problems of motion;
5. Evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. Explain and apply the principles of conservation of energy, linear and angular momentum;
7. Describe the laws governing motion under gravity; and
8. Explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

Course Contents

Space and time; units and dimension, vectors and scalars, differentiation of vectors: displacement, velocity and acceleration; kinematics; Newton's laws of motion (inertial frames, impulse, force and action at a distance, momentum conservation); relative motion; application of Newtonian mechanics; equations of motion; conservation principles in Physics, conservative forces, conservation of linear momentum, kinetic energy and work, potential energy, system of particles, centre of mass; rotational motion; torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates; conservation of angular momentum; circular motion; moments of inertia, gyroscopes and precession; gravitation: Newton's law of gravitation, Kepler's laws of planetary motion, gravitational potential energy, escape velocity, satellites motion and orbits.

PHY 102 GENERAL PHYSICS II (ELECTRICITY & MAGNETISM) (2 Units C: LH 30)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the electric field and potential and related concepts, for stationary charges;
2. Calculate electrostatic properties of simple charge distribution using Coulomb's law, Gauss's Law and electric potential;
3. Describe and determine the magnetic field for steady and moving charges;
4. Determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. Describe electromagnetic induction and related concepts and make calculations using Faraday and Lenz's laws;
6. Explain the basic physical of Maxwell's equations in integral form;
7. Evaluate DC circuits to determine the electrical parameters; and

- Determine the characteristics of AC voltages and currents in resistors, capacitors and Inductors.

Course Contents

Forces in nature, electrostatics, electric charge and its properties, methods of charging, Coulomb's law and superposition, electric field and potential, Gauss's law, capacitance, electric dipoles, energy in electric fields, conductors and insulators, current, voltage and resistance, Ohm's law and analysis of DC circuits, magnetic fields, Lorentz force, Biot-Savart and Ampère's laws, magnetic dipoles, dielectrics, energy in magnetic fields, electromotive force, electromagnetic induction, self and mutual inductances, Faraday and Lenz's laws, step up and step down transformers. Maxwell's equations, electromagnetic oscillations and waves, AC voltages and currents applied to inductors, capacitors, resistance and combinations.

PHY 103 GENERAL PHYSICS III (BEHAVIOUR OF MATTER) (2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Explain the concepts of heat and temperature and relate the temperature scales;
2. Define, derive and apply the fundamental thermodynamic relations to thermal systems;
3. Describe and explain the first and second laws of thermodynamics, and the concept of entropy;
4. State the assumptions of the kinetic theory and apply techniques of describing macroscopic behaviour;
5. Deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium; and
6. Describe and determine the effect of forces and deformation of materials and surfaces.

Course Contents

Heat and temperature, temperature scales; gas laws; general gas equation; thermal conductivity; first Law of thermodynamics; heat, work and internal energy, reversibility; thermodynamic processes; adiabatic, isothermal, isobaric; second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; molecular collisions and mean free path; elasticity; Hooke's law, Young's shear and bulk moduli; hydrostatics; pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 104 GENERAL PHYSICS III (VIBRATION, WAVES AND OPTICS)

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe and quantitatively analyse the behaviour of vibrating systems and wave energy;
2. explain the propagation and properties of waves in sound and light;
3. identify and apply the wave equations; and
4. explain geometrical optics and principles of optical instruments.

Course Contents

Simple harmonic motion (SHM): energy in a vibrating system, Damped SHM, Q values and power response curves, Forced SHM, resonance and transients, Coupled SHM. Normal modes. Waves: types and properties of waves as applied to sound; Transverse and Longitudinal waves; Superposition, interference, diffraction, dispersion, polarization; Waves at interfaces; Energy and power of waves, the 1-D wave equation, 2-D and 3-D wave equations, wave energy and power, phase and group velocities, echo, beats, the Doppler effect, Propagation of sound in gases, solids and liquids and their properties. Optics: Nature

and propagation of light; reflection, refraction, and internal reflection, dispersion, scattering of light, reflection and refraction at plane and spherical surfaces, thin lenses and optical instruments, wave nature of light; Huygens's principle, interference and diffraction.

PHY 107 GENERAL PRACTICAL PHYSICS I (1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs; and
5. Draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements. Experimental techniques. The treatment of measurement errors. Graphical analysis. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc. (covered in PHY 101, 102, 103 and PHY 104). However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis, and deduction.

PHY 108 GENERAL PRACTICAL PHYSICS II (1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs;
5. Draw conclusions from numerical and graphical analysis of data; and
6. Prepare and present practical reports.

Course Contents

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses that have been covered with emphasis on quantitative measurements, the treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

STA 112 PROBABILITY I (3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the differences between permutation and combination;
2. explain the concept of random variables and relate it to probability and distribution functions;
3. describe the basic distribution functions; and
4. explain the concept exploratory data analysis.

Course Contents

Permutation and combination. Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distributions: Binomial, geometric, Poisson, normal and sampling distributions; exploratory data analysis.

GET 101 ENGINEER IN SOCIETY

(1 Unit C: LH 15)

Learning Outcomes

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

1. Differentiate between science, engineering and technology, and relate them to innovation;
2. Distinguish between the different cadres of engineering – engineers, technologists, technicians and craftsmen and their respective roles and competencies;
3. Identify and distinguish between the relevant professional bodies in engineering;
4. Categorise the goals of global development or sustainable development goals (SDGs); and
5. Identify and evaluate safety and risk in engineering practice.

Course Contents

History, evolution and philosophy of science. engineering and technology. The engineering profession – engineering family (engineers, technologists, technicians and craftsmen), professional bodies and societies. Engineers' code of conduct and ethics, and engineering literacy. Sustainable development goals (SDGs), innovation, infrastructures and nation building - economy, politics, business. Safety and risk analysis in engineering practice. Engineering competency skills – curriculum overview, technical, soft and digital skills. Guest seminars and invited lectures from different engineering professional associations.

GET 102 ENGINEERING GRAPHICS AND MODELLING I (2 Units C: LH 15; PH 45)

Learning Outcomes

1. At the end of this course, the students should be able to:
2. Have a good grasp of design thinking and be obsessed with the determination to apply such to solving simple every day and also complex problems;
3. Recognise the fundamental concepts of engineering drawing and graphics;
4. Show skills to represent the world of engineering objects in actionable solid models, and put such models in a form where they can be inputs for simulation and analyses;
5. Analyse such models for strength and cost;
6. Prepare the objects for modern production and manufacturing techniques of additive and subtractive manufacturing;
7. Recognise that engineering is multidisciplinary in the sense that mechanical, electrical and other parts of physical structures are modelled in context as opposed to the analytical nature of the courses they take; and
8. Analyse and master the basics of mechanical and thermal loads in engineering systems.

Course Contents

Introduction to design thinking and engineering graphics. First and third angle orthogonal projections. Isometric projections; sectioning, conventional practices, conic sections and development. Freehand and guided sketching – pictorial and orthographic. Visualization and solid modelling in design, prototyping and product-making. User interfaces in concrete terms. Design, drawing, animation, rendering and simulation workspaces. Sketching of 3D objects. Viewports and sectioning to shop drawings in orthographic projections and perspectives. Automated viewports. Sheet metal and surface modelling.

Material selection and rendering. This course will use latest professional design tools such as fusion 360, solid works, solid edge or equivalent.

CPE 112: Introduction to Computer Engineering

(2 Units C: LH 30)

Learning Outcomes

At the end of the course the student should be able to:

1. explain the profession of computer engineering;
2. the roles played by computer engineers; and
3. explain the historical development of computers.

Course Contents

Historical development of modern computing and computer engineering profession; roles and responsibilities of the computer engineer; career paths and development (public and private sectors, academic/research and industry); overview of computer engineering design; computer devices/hardware in the age of 'smartness' and Internet of Things and People 'IoTs and P'; identification of computer software and hardware components and operational relationships (central processing units, input/output devices, operating systems, languages).

BU-CPE 101 Computer Programming for Engineers

(2 Units C: LH 15; PH 45)

Learning Outcomes

On completion of this course, students should be able to:

1. Be proficiency in a programming language: Engineers will be able to write programs in a chosen programming language such as C, C++, Python, or MATLAB, and apply their knowledge to solve real-world problems.
2. Understand algorithms and data structures: Engineers will be able to understand the basic concepts of algorithms and data structures and apply them in their programs.
3. Have knowledge of software design: Engineers will understand the process of software design, including the creation of a plan for how the software should be organized and implemented to achieve its desired goals.
4. Have problem-solving skills: Engineers will develop critical thinking and problem-solving skills through the process of creating software solutions to solve complex problems.
5. interact with hardware systems: Engineers will be able to create software programs that interact with hardware systems, enabling them to develop solutions for real-world problems.
6. Have debugging and testing skills: Engineers will learn how to identify and fix bugs in their programs, as well as how to test their programs to ensure they are working as intended.
7. Be awareness of software security: Engineers will gain an understanding of software security issues and learn how to write secure code.

Course Contents

Introduction to programming. Programming languages. Variables. Data types. Data structures. Control structures and flow of execution. Functions and modules. Arrays and lists. Basic algorithms and data structures. Object-oriented programming (OOP). File handling. Exception handling and debugging. Software design and development methodologies. Software testing and quality assurance. Interfacing with hardware systems. Database programming. Network programming. Web development. Software security and encryption. Project work and team collaboration.

ENT 211 ENTREPRENEURSHIP AND INNOVATION

(2 Units C: LH 30)

Learning Outcomes

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

1. Explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation and risk-taking;
2. State the characteristics of an entrepreneur;
3. Analyse the importance of micro and small businesses in wealth creation, employment generation and financial independence;
4. Engage in entrepreneurial thinking;
5. Identify key elements in innovation;
6. Describe the stages in enterprise formation, partnership and networking, including business planning;
7. Describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world; and
8. State the basic principles of e-commerce.

Course Contents

The concept of entrepreneurship (entrepreneurship, intrapreneurship/corporate entrepreneurship); theories, rationale and relevance of entrepreneurship (Schumpeterian and other perspectives, risk-taking, necessity and opportunity-based entrepreneurship, and creative destruction); characteristics of entrepreneurs (opportunity seeker, risk-taker, natural and nurtured, problem solver and change agent, innovator and creative thinker); entrepreneurial thinking (critical thinking, reflective thinking and creative thinking).

Innovation (The concept of innovation, dimensions of innovation, change and innovation, knowledge and innovation). Enterprise formation, partnership and networking (basics of business plan, forms of business ownership, business registration and alliance formation, and joint ventures). Contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office and networking). Entrepreneurship in Nigeria (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

GST 212 PHILOSOPHY, LOGIC AND HUMAN EXISTENCE (2 Units C: LH 30)

Learning Outcomes

At the end of the course, students should be able to:

1. Know the basic features of philosophy as an academic discipline;
2. Identify the main branches of philosophy & the centrality of logic in philosophical discourse;
3. Know the elementary rules of reasoning;
4. Distinguish between valid and invalid arguments;
5. Think critically and assess arguments in texts, conversations and day-to-day discussions;
6. Critically assess the rationality or otherwise of human conduct under different existential conditions;
7. Develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge, and
8. Guide his or her actions, using the knowledge and expertise acquired in philosophy and logic.

Course Contents

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character molding.

BU – GST 200 COMMUNICATION IN FRENCH

(1 Units: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Abilities to greet
2. Knowing how to express time.
3. Knowledge of counting up 1000
4. Conjugaison of Etre and Avoir and be able to form sentences with the auxiliaries
5. Use pronoun instead of names
6. Make sentences in present tense with the verbs
7. Presentation of oneself in French Language.
8. Essay witing.

Course Contents

Alphabet. Salutation. L'heure. Le nombre. Le pronom personnel et l'auxiliaire Avoir et Être Les trois groupe verbes au présent de l'indicatif () premier groupe verbe, Deuxième groupe verbe, Troisième groupe verbe) Adjective possessive, Adjective Démonstratif etc et présentation

BU – GST 215 ADVENTIST HERITAGE

(3 Units: C: LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Explain the history of the Seventh-day Adventist Church.
2. Illustrate the systematic development of the Seventh-day Adventist Church.
3. State the contributions of at least five (5) pioneers of the Seventh-day Adventist Church.
4. Explain the seven (7) pillars of the Seventh-day Adventist church doctrine.
5. Describe the Seventh-day Adventists' concepts of holistic education, health reforms, and publishing ministries.
6. Identify at least eight (8) major contributions of Adventist education, health reforms, and publishing ministries.
7. Enumerate at least (7) areas in which the prophetic gift has shaped the mission of the Seventh-day Adventist Church.
8. Explain the meaning of Adventism and the aim of Adventist mission.
9. Describe the dynamics involved in the origin and growth of Seventh-day Adventism in Africa.
10. List at least eight (8) major contributions of the Seventh-day Adventism in Africa, with specific focus on national growth and development.

Course Contents

The historical and prophetic origin of the Seventh-day Adventist Church. Millerite roots, before 1844. The 1844 experiences. The development and organization of the Seventh-day Adventist Church. The era of doctrinal and organizational development (1844 – 1863). The era of institutional and lifestyle development (1863ff). The era of revival, reform, and expansion (1888 – 1900). The era of reorganization and Crisis (1901 - 1910). The era of worldwide growth (1910 – 1955). The challenges and possibilities of maturity (1955). The contributions of the pioneers and founders of the Seventh-day Adventist Church. The Pillars of Adventism. Adventists' concepts of holistic education. Healthcare and reforms. Publishing ministries. The prophetic gift in the Seventh-day Adventist Church. Significance of prophetic gift to the

Adventist Mission. The purpose of Adventism. Adventist concept of mission. The origin, exploits and challenges of Seventh-day Adventism in Africa. Contributions of the Seventh-day Adventism in Africa.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts.

BU – GST 220 ORIGIN OF SCIENCE

(1 Unit: C: LH 15)

Learning Outcomes:

On completion of the course, the students should be able to:

1. Outline the major steps of the scientific method and its limitations.
2. Describe three (3) scientific theories on the origin of life and their major challenges.
3. State two (2) characteristics of a molecular structure that posed challenges to evolution.
4. Identify one (1) strength and drawback of the geologic column and fossil record to the evolutionary concept.
5. State two (2) evidences in nature and archeology that support Biblical creation account.
6. List three (3) faith-believing and non-faith scientists and their major contributions to science.
7. List two (2) alternative theories to evolution and their evidence.
8. Discuss the harmony between science and religion.

Course Contents

Religion and Science. Origin, Creation and the Flood. Scientific theories about the Origin of Life. Darwinism and theory of Evolution. Micro- and Macro-evolution. Geologic column, Fossil record. Aspects of Human origin. Drawback to the theory of evolution and Darwinism. Cambrian explosion. Incompleteness of the Fossil record. Origin of the Universe and the Total Environment. The Big bang theory. Scientific dating and drawback. Alternative theories of Origin. Intelligent Design (ID). Molecular machines and Irreducible Complexity (IC). Specificity and regulation of the DNA. Fine tuning of the Universe. Uniqueness of the Planet Earth and Life. The Flood. The Scientific method and Limitations of Science. Science, Reasoning and Faith.

Minimum Academic Standards

None.

BU – GST 221 INTRODUCTION TO AGRICULTURE

(1 Unit: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Recall the definition and discuss at least three (3) of the branches of agriculture.
2. Critique five important agricultural policies in Nigeria.
3. Discuss the objectives of Soil Science.
4. Discuss 5 physical properties of soil.
5. Discuss the characteristics of different soil types.
6. Discuss the reasons for losses of agricultural soil
7. Discuss different types of agricultural systems and practices with relevant examples in Nigeria
8. Describe the different types of crops with examples from across Nigeria
9. Discuss the problems facing livestock producers across Nigeria
10. Describe 3 common management practices in poultry/livestock production.

Course Contents

Introduction to Agriculture, its origin, branches and importance; Definition, scope and objectives & review of Agricultural policies; Introduction to soil science, its aims and objectives; Soil formation and soil physical properties; Erosion; Introduction to Crop Science (Agricultural systems/practices); Livestock production (importance & problems of livestock industry); Production practices of some selected ruminants, monogastric & non-ruminant herbivores; Non-conventional livestock production practices

Minimum Academic Standards

Field experimental plots

BU – GST 290 INTRODUCTION TO DATA ANALYTICS (1 Unit: C: LH 15; PH 45)

Learning Outcome

On completion of the course. Students should be able to do:

1. uncertainty analysis
2. data fitting
3. feed-forward neural networks
4. probability density functions
5. correlation functions
6. fourier analysis and FFT procedures
7. spectral analysis
8. digital filtering
9. hilbert transforms.

Course Content

Connecting to data. Simplifying and sorting data. Organizing data. Posing a question. Wrangling data into a format. fixing data problems. exploring the data. finding patterns. building intuition. comparing measures. Statistics and forecasting. Dashboards and stories.

Lab Work: Students will undertake the following tasks in the practical classes; learn how to analyze data to understand data through natural language queries that allows to ask questions about data without having to write complicated formulas. In addition, students will learn how to analyze data to provide high-level visual summaries, trends, and patterns.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement.

GET 201 APPLIED ELECTRICITY (3 Units C: LH 30; PH 45)

Learning Outcomes

Students will be able to:

1. Discuss the fundamental concepts of electricity and electrical d.c. Circuits;
2. State, explain and apply the basic d.c. circuit theorems;
3. Explain the basic a.c. circuit theory and
4. Apply to solution of simple circuits.

Course contents

Fundamental concepts: Electric fields, charges, magnetic fields. current, B-H curves Kirchoff's laws, superposition. Thevenin, Norton theorems, Reciprocity, RL, RC, RLC circuits. DC, AC bridges,

Resistance, Capacitance, Inductance measurement, Transducers, Single phase circuits, Complex j - notation, AC circuits, impedance, admittance, susceptance.

GET 202 ENGINEERING MATERIALS

(3 Units C: LH 45)

Learning Outcomes

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

1. Demonstrate the role of atoms and molecules (aggregates of atoms) in the building of solid/condensed matter known as engineering materials, the electrons quantum numbers and how the electrons are arranged in different atomic elements, and explain the role of electronic configuration and valence electrons in bonding;
2. Define metals, alloys and metalloids, demonstrate mental picture of the solid mineral resources development as a relay race among four 'athletes': geologist, mining engineer, mineral processing technologist, process metallurgical engineer, and classify metallurgical engineering into 3Ps: process, physical and production;
3. Explain the relationship between structure and properties of materials, characteristics, components and compositions of phase diagrams and phase transformations of solid solutions;
4. Define ceramics, glass and constituents of glasses and understand application of ceramics in mining, building, art and craft industries;
5. Define and classify polymers as a class of engineering materials and polymeric materials, demonstrate polymerisation reactions, their types and mechanism, and applications of polymers;
6. Define properties, types and application of composite materials and fibres (synthetic and natural);
7. Define and classify nanomaterials, demonstrate applications of nanomaterials, concept, design and classification of fracture mechanics, corrosion classification, including the five principal ways of controlling corrosion and metal finishing processes such as sherardising, galvanising and anodising; and
8. Identify factors affecting the performance and service life of engineering materials/metals and metallography of metals/materials (materials anatomy), which enables metallurgical and materials engineers to prescribe appropriate solutions to test metals/materials fitness in service through structure-property-application relationships.

Course Contents

Basic material science; atomic structure, atomic bonding and crystal structures. Engineering materials situating metals and alloys; metals and alloys, classifications of metals, metal extraction processes using iron and steel (ferrous) and aluminium (nonferrous) as examples, phase diagrams/iron carbon diagrams, and mechanical workings of metals. Selection and applications of metals and alloys for specific applications in oil, aerospace, construction, manufacturing and transportation industries, among others. Ceramics (including glass); definition, properties, structure and classifications of ceramics. Bioactive and glass – ceramics. Toughening mechanism for ceramics. Polymers; definition of polymers as engineering materials, chemistry of polymeric materials, polymer crystallisation, polymer degradation and aging. Thermoplastic and thermosetting polymers and concepts of copolymers and homopolymers. Composites; definition, classification, characterisation, properties and composite. Applications of composites. Nanomaterials; definition, classification and applications of nanomaterials as emerging technology. Processing of nanomaterials including mechanical grinding, wet chemical synthesis, gas phase synthesis, sputtered plasma processing, microwave plasma processing and laser ablation. Integrity assessment of engineering materials; effect of engineering design, engineering materials processing, selection, manufacturing and assembling on the performance and service life of engineering materials. Metallography and fractography of materials. Mechanical testing (destructive testing) of materials such

as compressive test, tensile test, hardness test, impact test, endurance limit and fatigue test. Non-destructive test (NDT) such as dye penetrant, x-ray and eddy current.

GET 203: ENGINEERING GRAPHICS AND SOLID MODELING II (3 Units C: LH30; PH45)

Learning Outcomes

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

1. apply mastery of the use of projections to prepare detailed working drawing of objects and designs;
2. develop skills in parametric design to aid their ability to see design in the optimal specification of materials and systems to meet needs;
3. be able to analyze and optimize designs on the basis of strength and material minimization;
4. get their appetites wetted in seeing the need for the theoretical perspectives that create the basis for the analysis that are possible in design and optimization, and recognize/understand the practical link to excite their creativity and ability to innovate; and
5. be able to translate their thoughts and excitements to produce shop drawings for multiphysical, multidisciplinary design.

Course Contents

Projection of lines, auxiliary views and mixed projection. Preparation of detailed working production drawing; semi-detailed drawings, conventional presentation methods. Solid, surface and shell modeling. Faces, bodies and surface intersections. Component-based design. Component assembly and motion constraints. Constrained motions and animation. Introduction to electronics modeling. Electronics board layout preparation, Component libraries and Schematic design. Parametric modeling and adaptive design. Simulation for material optimization. Designing for manufacturing. Additive and subtractive manufacturing. Production for 3-D printing, Laser cutting and CNC machinery. Arrangement of engineering components to form a working plant (Assembly Drawing of a Plant).

GET 204: STUDENTS WORKSHOP PRACTICE

(2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. identify various basic hand and machine tools, analogue and digital measurement devices and instruments, and acquire skills in their effective use and maintenance;
2. practically apply basic engineering technologies, including metrology, casting, metal forming and joining, materials removal, machine tooling (classification, cutting tool action, cutting forces, non-cutting production) and CNC machining technology;
3. master workshop and industrial safety practices, accident prevention and ergonomics;
4. physically recognise different electrical & electronic components like resistances, inductances, capacitances, diodes, transistors and their ratings;
5. connect electric circuits, understand different wiring schemes, and check ratings of common household electrical appliances and their basic maintenance; and
6. determine household and industrial energy consumption, and understand practical energy conservation measures.

Course Contents

The course comprises general, mechanical and electrical components: supervised hands-on experience in safe usage of tools and machines for selected tasks; Use of measuring instruments (calipers, micrometers, gauges, sine bar, wood planners, saws, sanders, and pattern making). Machine shop: lathe work shaping, milling, grinding, reaming, metal spinning. Hand tools, gas and arc welding, cutting, brazing and soldering. Foundry practice. Industrial safety and accident prevention, ergonomics, metrology. Casting processes. Metal forming processes: hot-working and cold-working processes (forging, press-tool work, spinning, etc.). Metal joining processes (welding, brazing and soldering). Heat treatment. Material removal processes. machine tools and classification. Simple theory of metal cutting. Tool action and

cutting forces. Introduction to CNC machines. Supervised identification, use and care of various electrical and electronic components such as resistors, inductors, capacitors, diodes and transistors. Exposure to different electric circuits, wiring schemes, analogue and digital electrical and electronic measurements. Household and industrial energy consumption measurements. Practical energy conservation principles.

GET 207: APPLIED MECHANICS

(3 Units C: LH 45)

Learning Outcomes

Students will acquire the ability to:

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

Course Contents

Statics. Fundamentals of mechanics. Forces in a plane. Forces in space. Equivalent systems of forces. Equilibrium of rigid bodies in two and three dimensions. Equivalent systems of forces. Distributed forces. Centroid. Center of mass. Analysis of simple structures and machine parts. Frictional forces. Moments of inertia. Principle of virtual work. Newton's laws of motion. Kinetic energy and momentum analyse. Dynamics. Kinematics of a particle. Rectilinear motion of particles. Curvilinear motion of particles. Kinetics of particles. Force. Mass and acceleration. Kinetics of particles. Work and energy. Impulse and momentum. Kinematics of rigid bodies. Forces and acceleration.

GET 209: ENGINEERING MATHEMATICS I

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. solve qualitative problems based on vector and matrix analyses such as linear independence and dependence of vectors, rank etc;
2. describe the concepts of limit theory and n th order differential equations and their applications to physical phenomena;
3. solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables;
4. describe the applications of double and triple integration in finding the area and volume of engineering solids, and explain the qualitative applications of Gauss, Stoke's and Green's theorem;
5. explain ordinary differential equations and applications, and develop a mathematical model of linear differential equations, as well as appreciate the necessary and sufficient conditions for total differential equations; and
6. analyse basic engineering models through partial differential equations such as wave equation, heat conduction equation, etc., as well as fourier series, initial conditions and its applications to different engineering processes

Course Contents

Limits, continuity, differentiation, introduction to linear first order differential equations, partial and total derivatives, composite functions, matrices and determinants, vector algebra, vector calculus, directional derivatives.

GET 210: ENGINEERING MATHEMATICS II

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

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

Course Contents

Introduction to ordinary differential equations (ODEs); theory, applications, methods of solution; second order differential equations. Advanced topics in calculus (vectors and vector-valued function, line integral, multiple integral and their applications). Elementary complex analysis including functions of complex variables, limits and continuity. Derivatives, differentiation rules and differentiation of integrals. Cauchy-Riemann equation, harmonic functions, basic theory of conformal mapping, transformation and mapping and its applications to engineering problems. Special functions.

GET 211: COMPUTING AND SOFTWARE ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems;
2. develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from Python, Java or C++;
3. use widely available libraries to prepare them for machine learning, graphics and design simulations;
4. develop skills in eliciting user needs and designing an effective software solution;
5. recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services; and
6. acquire capabilities that can further be developed to make them productively employable by means of short Internet courses in specific areas.

Course Contents

Introduction to computers and computing; computer organisation – data processing, memory, registers and addressing schemes; Boolean algebra; floating-point arithmetic; representation of non-numeric information; problem-solving and algorithm development; coding (solution design using flowcharts and pseudo codes). Data models and data structures; computer software and operating system; computer operators and operator's precedence; components of computer programs; introduction to object oriented, structured and visual programming; use of MATLAB in engineering applications. ICT fundamentals, Internet of Things (IoT). Elements of software engineering.

BU-CPE 202 INNOVATIVE TECHNOLOGIES AND EMERGING TRENDS (2 Units; C; LH 30)

Learning Outcomes

At the end of this course, the student should be able to:

1. Analyze and understand the impact of innovative technologies on different domains of society
2. Evaluate new and emerging technologies and their potential applications
3. Synthesize knowledge from multiple sources to develop informed perspectives on technological advancements
4. Identify ethical, social, and political implications of innovative technologies
5. Communicate technical information and ideas effectively to a variety of audiences
6. Collaborate and engage with diverse stakeholders to solve complex problems
7. Develop a critical and creative perspective on the future possibilities and challenges posed by innovative technologies
8. Identify and pursue opportunities for innovation in various domains of society
9. Utilize technology in a responsible and sustainable manner to enhance the well-being of society
10. Continuously learn and adapt to new developments in the field of innovative technologies and emerging trends.

Course Contents

Overview and introduction to innovative technologies and emerging trends. Emerging technologies such as artificial intelligence, robotics, the Internet of Things, and blockchain. The impact of innovative technologies on different industries and sectors. Innovation management and entrepreneurship. Emerging trends in digital marketing and e-commerce. Big data analytics and data science. Virtual and augmented reality technologies. Cloud computing and its impact on businesses and organizations. Emerging trends in cybersecurity and data privacy. The role of innovative technologies in the future of work. The role of emerging technologies in sustainable development and environmental protection. The impact of 5G and other advanced communication technologies. The role of innovative technologies in healthcare and medicine. The future of mobility and transportation. The role of emerging technologies in education and lifelong learning. The impact of innovative technologies on society and culture. Future trends and predictions for innovative technologies and emerging trends.

GET 290: STUDENTS INDUSTRIAL WORK EXPERIENCE I (3 Units C: 9 weeks)

Learning Outcomes

SIWES I should provide opportunity for the students to:

1. acquire industrial workplace perceptions, ethics, health and safety consciousness, inter-personal skills and technical capabilities needed to give them a sound engineering foundation;
2. learn and practise 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.

Course Contents

Practical experience in a workshop or industrial production facility, construction site or special centers in the university environment, considered suitable for relevant practical/industrial working experience but not necessarily limited to the student's major. The students are exposed to hands-on activities on workshop safety and ethics, maintenance of tools, equipment and machines, welding, fabrication and foundry equipment, production of simple devices; electrical circuits, wiring and installation. (8-10 weeks during the long vacation following 200 level).

ENT 312: VENTURE CREATION

(2 Units C: LH 15; PH 45)

Learning Outcomes

At the end of this course, students, through case study and practical approaches, should be able to:

1. describe the key steps in venture creation;
2. spot opportunities in problems and in high potential sectors, regardless of geographical location;
3. state how original products, ideas and concepts are developed;
4. develop a business concept for further incubation or pitching for funding
5. identify key sources of entrepreneurial finance;
6. implement the requirements for establishing and managing micro and small enterprises;
7. conduct entrepreneurial marketing and e-commerce;
8. apply a wide variety of emerging technological solutions to entrepreneurship; and
9. appreciate why ventures fail due to lack of planning and poor implementation.

Course Contents

Opportunity identification (sources of business opportunities in Nigeria, environmental scanning, demand and supply gap/unmet needs/market gaps/market research, unutilized resources, social and climate conditions and technology adoption gap). New business development (business planning, market research). Entrepreneurial finance (venture capital, equity finance, micro-finance, personal savings, small business investment organizations and business plan competition). Entrepreneurial marketing and e-commerce (principles of marketing, customer acquisition & retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E-commerce business models and successful e-commerce companies). Small business management/family business: Leadership & Management, basic book keeping, nature of family business and family business growth model. Negotiation and business communication (strategy and tactics of negotiation/bargaining, traditional and modern business communication methods). Opportunity discovery demonstrations (business idea generation presentations, business idea contest, brainstorming sessions, idea pitching). Technological solutions (The concept of market/customer solution, customer solution and emerging technologies, business applications of new technologies - artificial intelligence (AI), virtual/mixed reality (VR), Internet of things (IoTs), blockchain, cloud computing, renewable energy, etc. Digital business and e-commerce strategies).

GST 312: PEACE AND CONFLICT RESOLUTION

(2 Units C: LH 30)

Learning Outcomes

At the end of this Course, students should be able to:

1. analyse the concepts of peace, conflict and security;
2. list major forms, types and root causes of conflict and violence;
3. differentiate between conflict and terrorism;
4. enumerate security and peace building strategies; and
5. describe the roles of international organisations, media and traditional institutions in peace building.

Course Contents

The concepts of peace, conflict and security in a multi-ethnic nation. Types and theories of conflicts: ethnic, religious, economic, geo-political Conflicts; structural conflict theory, realist theory of conflict, frustration-aggression conflict theory; root causes of conflict and violence in Africa: indigene and settlers phenomenon, boundaries/boarder disputes, political disputes, ethnic disputes and rivalries, economic inequalities, social disputes, nationalist movements and agitations; selected conflict case studies – Tiv-Junkun, ZangoKartaf, chieftaincy and land disputes, etc. Peace building, management of conflicts and security: Peace & Human Development. Approaches to Peace & Conflict Management (religious, government, community leaders, etc.). Elements of peace studies and conflict resolution: Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and terrorism. Peace mediation and peace keeping. Peace and Security Council (international, national and local levels). Agents of conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution

By the end of this course, the student should be able to

1. Describe the Biblical foundation of family
2. Explain and appreciate the foundations of marriage
3. Identify the different marital relationships.
4. Develop a personal philosophy of family that encompasses personal, cultural and spiritual values.
5. Develop skills for successful marital and other interpersonal relationships and ways of
6. handling different marital conflicts
7. Effectively and positively apply the knowledge and skills acquired now and in the future
8. in the students' own family and
9. Help individuals, couples or families in making their marital relationships more enjoyable and less crises ridden.

Course Content

Introduction, Definition of family, types of families, Definition of marriage, biblical foundations of marriage, purpose of marriage, characteristics of marriage, processes/stages of marriage Dating, Courtship & Engagement, Good and wrong reasons for dating, Enumerate the benefits of dating, factors to consider during courtship, practices to be avoided during courtship, factors to consider in readiness for marriage. Marriage as a major life decision, foundations of successful marriage, strategies for mate selection, Qualities to look for in a prospective wife, Qualities to look for in a prospective husband, Relevance of domestic training in marriage, Inter-ethnic and inter-racial marriages, Marriage ceremonies and their characteristics, Forbidden marriages, Significance of bride price in African Culture, Honeymoon, Marital Adjustment: Sexual Behavior in marriage, Expected sexual behavior in marriage, Sexual dysfunctions,- Extra-marital affairs, causes, effects and control ,Marital Adjustment: Financial management in marriage and In-laws, Handling financial issues , Family finance and budgeting, Dealing with in-laws,- Siblings relationship in marriage, Establishing a New Home,- Building and furnishing the Home ,Family Roles and Responsibilities role of the father, mother, children Child bearing and child rearing, Family planning methods,- Biblical perspectives on parenting and child rearing, The four parenting styles, Conflict and conflict resolution, Causes of marital conflict, Basic steps on conflict resolution, Divorce in marriage, Causes, effect, control, Domestic Violence.

BU – GST 317 FUNDAMENTALS OF CHRISTIAN FAITH (3 Units C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the history and development of the Old Testament and the New Testament Scripture;
2. Enumerate at least five (5) attributes of God;
3. Identify any seven (7) characteristic features of the Holy Spirit;
4. Assess any five (5) interconnectedness between the Law and grace;
5. Enumerate at least five (5) evidences of the biblical Sabbath;
6. Identify the symbolism and interpretation of the Daniel 2.
7. Assess at least four (4) signs of Christ's Second Coming;
8. Explain at least three (3) of the biblical ordinances in the scriptures
9. Describe any three (3) of the Christian lifestyles

Course Contents

Nature of Inspiration. God's Word. Authenticity of the Bible. Theology of God: His Names & Attributes. The Holy Spirit. Creation. Origin of Sin. Fall of Man. The Flood. Jesus' Incarnation and Ministry of Intercession. Law and Grace. The Sabbath. The Church and its Mission. Prophecy of Daniel 2. Second Coming. The Signs of the Second Coming. Manner of Jesus' Second Coming. Millennium and the New Earth. Biblical Ordinances. Christian Lifestyles. Prophetic Gift and the Church.

Minimum Academic Standards

Standard Modern library.

GET 301: ENGINEERING MATHEMATICS III

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. demonstrate a clear understanding of the course content, that is, possess a breadth of knowledge in the area covered;
2. possess an in-depth knowledge upon which a solid foundation can be built in order to demonstrate a depth of understanding in advanced mathematical topics;
3. develop simple algorithms and use computational proficiency;
4. write simple proofs for theorems and their applications; and
5. communicate the acquired mathematical knowledge effectively in speech, writing and collaborative groups.

Course Contents

Linear Algebra. Elements of Matrices, Determinants, Inverses of Matrices. Theory of Linear Equations. Eigen Values and Eigen Vectors. Analytical Geometry. Coordinate Transformation. Solid Geometry. Polar, cylindrical and spherical coordinates. Elements of functions of several variables. Surface Variables. Ordinary Integrals. Evaluation of Double Integrals, Triple Integrals, Line Integrals and Surface Integrals. Derivation and Integrals of Vectors. The gradient of scalar quantities. Flux of Vectors. The curl of a vector field, Gauss, Greens and Stoke's theorems and applications. Singular Valued Functions. Multivalued Functions. Analytical Functions. Cauchy Riemann's Equations. Singularities and Zeroes. Contour Integration including the use of Cauchy's Integral Theorems. Bilinear transformation.

GET 302: ENGINEERING MATHEMATICS IV

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. solve second order differential equations;
2. solve partial differential equations;
3. solve linear integral equations;
4. relate integral transforms to solution of differential and integral equations;
5. explain and apply interpolation formulas; and
6. apply Runge-Kutta and other similar methods in solving ODE and PDEs.

Course Contents

Series solution of second order linear differential equations with variable coefficients. Bessel and Legendre equations. Equations with variable coefficients. Sturm-Liouville boundary value problems. Solutions of equations in two and three dimensions by separation of variables. Eigen value problems. Use of operations in the solution of partial differential equations and Linear integral equations. Integral transforms and their inverse including Fourier, Laplace, Mellin and Handel Transforms. Convolution integrals and Hilbert Transforms. Calculus of finite differences. Interpolation formulae. Finite difference

equations. RungeKutta and other methods in the solutions of ODE and PDEs. Numerical integration and differentiation.

GET 304 ENGINEERING COMMUNICATION, TECHNICAL WRITING AND PRESENTATION (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the student should be able to:

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

Course Contents

A brief review of common pitfalls in writing. Principles of clear writing (punctuations and capitalization). Figures of speech. Units of grammar. Tenses and verb agreement. Active and passive sentences Lexis, structure Fog and Index concept. Skills for communication and communication algorithm. Types and goals of communication; Interpersonal communication; features and the Finger Model or A,B,C,D,E of good interpersonal communication (accuracy of technical terms, brevity of expression, clarity of purpose, directness of focus and effectiveness of the report). Language and organisation of reports. Technical report writing skills (steps, problems in writing, distinguishing technical and other reports, significance, format and styles of writing technical reports). Different formats for communication; styles of correspondences – business report and proposal, business letter, memorandum, e-mails, etc. Proposals for projects and research; format, major steps and tips of grant-oriented proposals. Research reports (competency, major steps, components and formats of research reports and publishable communication). Sources and handling of data, tables, figures, equations and references in a report. Presentation skills; overview, tips, organisation, use of visual aids and practicing of presentation. Intellectual property rights in research reports. Engineering and Technology Case studies of major engineering designs, proposals and industrial failures with professional presentation of reports.

GET 305: ENGINEERING STATISTICS AND DATA ANALYTICS (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. work with data from the point of view of knowledge convergence, machine learning, and intelligence augmentation, which significantly raises their standard for engineering analysis (the approach forces them to learn statistics in an actionable way that helps them to see the holistic importance of data analytics in modern engineering and technology);
2. anticipate the future with Artificial Intelligence while fulfilling the basic requirements of conventional engineering statistical programming consistent with their future careers;
3. construct appropriate graphical displays of data and highlight the roles of such displays in data analysis, particularly the use of statistical software packages;
4. plan and execute experimental programmes to determine the performance of programme-relevant industrial engineering systems, and evaluate the accuracy of the measurements undertaken; and
5. demonstrate mastery of data analytics and statistical concepts by communicating the results of experimental and industry-case investigations, critically reasoned scientific and professional analysis through written and oral presentation.

Course Contents

Descriptive statistics, frequency distribution, populations and sample, central tendency, variance data sampling, mean, median, mode, mean deviation, percentiles, etc. Probability. Binomial, poisson hypergeometric, normal distributions, etc. Statistical inference intervals, test hypothesis and significance. Regression and correlation. Research and methodology. Introduction to big data analytics and cloud computing applications. Introduction to the R language; R as a calculator; Vectors, matrices, factors, data frames and other R collections. Iteration and looping control structures. Conditionals and other controls. Designing, using and extending functions. The Apply Family. Statistical modelling and inference in R.

GET 306: RENEWABLE ENERGY SYSTEMS AND TECHNOLOGY (3 units C: LH 30; PH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. identify the types, uses and advantages of renewable energy in relation to climate change;
2. design for use the various renewable energy systems;
3. recognise and analyse the current energy systems in Nigeria, their impacts on development and the global energy demand and supply scenarios;
4. appreciate the environmental impact of energy exploitation and utilisation, and pursue the sustainable development of renewable energy for various applications; and
5. recognise the exploitation, excavation, production, and processing of fossil fuels such as coal, petroleum and natural gas, and discuss the sources, technology and contribution to future energy demands of renewable energy.

Course Contents

Current and potential future energy systems in Nigeria and globally - resources, extraction, concepts in energy conversion systems; parallels and differences in various conversion systems and end-use technologies, with emphasis on meeting 21st-century national, regional and global energy needs in a sustainable manner. Various energy technologies in each fuel cycle stage for fossil (oil, gas, synthetic), nuclear (fission and fusion) and renewable (solar, biomass, wind, hydro, and geothermal). Energy types, storage, transmission and conservation. Analysis of energy mixes within an engineering, economic and social context. Sustainable energy; emphasize sustainability in general and in the overall concept of sustainable development and the link this has with sustainable energy as the fundamental benefit of renewable energy.

Practical Content: Simple measurement of solar radiation, bomb calorimeter determination of calorific value of fuels and biomass; measurement of the velocity of wind, waves and the energy that abound in them; laboratory production of biogas and determination of energy available in it; simple conversion of solar energy to electricity; transesterification of edible oil into biodiesel; simulation of geothermal energy; Geiger-Muller or Scintillation Counters' determination of uranium or thorium energy; simple solid or salt storage of energy; hybrid application of renewable energy.

CPE 301: COMPUTER ORGANISATION AND ARCHITECTURE (3 Units C: LH 45)

Learning Outcomes

1. Upon completion of this course, the students will be able to:
 1. describe the fundamental organisation 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 organisation of various parts of a system memory hierarchy;
 5. describe basic concept of parallel computing; and
 6. describe fundamentals concepts of pipeline and vector processing.

Course Contents

Computer fundamentals: development history of computer hardware and software; hardwired vs stored program concept; Von-Neuman architecture; Harvard architecture: principle of operation, advantages and disadvantages; single address machine; contemporary computers; computer system: block diagram,

functions, examples, dataflow and control line; computer arithmetic: integer arithmetic (addition, subtraction, multiplication, division), floating-point representation (IEEE), floating-point arithmetic, arithmetic and logic unit (ALU). Introduction to CISC and RISC architecture: principle of operation, merits and demerits; storage and input/output systems: computer function (fetch and execute cycles), interrupts, interconnection structures (bus structure and bus types); overview of memory system, memory chip organisation and error correction, cache memory, and memory storage devices; overview of I/O, programmed and interrupt-driven I/Os, DMA, I/O channel and I/O processor; control unit: micro-operations, control of the CPU, hard-wired implementation, control unit operation, micro-instruction sequencing and execution, and micro-programmed control; using INTEL family, and MOTOROLA family as case study of a CISC computer system; instruction set and register: machine instruction characteristics, types of operands and operations, instruction functions, addressing modes, instruction formats, register organisation, and instruction pipelining; high performance computer systems: techniques to achieve high performance, pipelining, storage hierarchy, and units with function dedicated for I/O; RISC, introduction to superscalar processor, and parallel processor; using popular RISC processor (e.g. i960, Motorola PowerPC) as case study. Operating system: overview of operating system, dimension and type of operating system: overview of operating system, dimension and type of operating system, high level scheduling, short-term scheduling, I/O scheduling, memory management, virtual memory, UNIX/LINUX operating system: architecture, commands, programming; window-based operating systems (MS windows).

CPE 302: MEASUREMENT AND INSTRUMENTATION (3 Units C: LH 30; PH 45)

Learning Outcome

At the end of the course the student should be able to:

1. analyse the performance characteristics of each instrument;
2. analyse basic metres such as voltmeters and ammeters;
3. explain 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 Contents

Transducers and applications; general instrumentation, basic meters in DC measurement, basic meters in AC measurements, rectifier, voltmeter, electro-dynamometer, and wattmeter, instrument transformers, DC and AC bridges and their applications general form of AC bridge, universal impedance bridge, electronic instruments for the measurement of voltage current resistance and other circuit parameters, electronic voltmeters, AC voltmeters using rectifiers, electronic multi meter, digital voltmeters; oscilloscope, vertical deflection system horizontal deflection system, probes, sampling CRO; and electronic function generators.

BU-CPE 303: ELECTROMAGNETIC FIELDS & WAVES (2 Units E: LH 30)

Learning Outcomes

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

1. describe the fundamentals of electrostatics and magneto-static;
2. identify the characteristics of materials and relate them to electric and magnetic fields;
3. demonstrate the theoretical background of Maxwell's equations; and
4. explain propagation characteristics, polarisation, reflection and other electromagnetic concepts.

Course Contents

Review of vector analysis techniques. Electromagnetic laws in integral forms. Gauss's law. Ampere's law. Electromagnetic fields. Magnetic fields in and around current carrying conductors. Varying magnetic fields. Conduction and displacement current. Maxwell's equation. Poynting vector. Propagation of electromagnetic waves in free space. Propagation of electromagnetic waves in material media.

Propagation of electromagnetic waves in dielectrics. Propagation of electromagnetic waves in conductors. Propagation of electromagnetic waves in ionised media. Characteristic impedance. Transmission line theory. Transmission line terminations. Waveguides. Resonators. The Smith charts. Use of Smith charts. Single Stub. Double Stub. Radiating elements. Antenna theory.

TEL 305: ELECTRICAL MACHINES

(3 Units C: LH 45)

Learning Outcomes

At the end of the course the student should be able to:

1. explain operating principles of fundamental components of Electric Machines: motors, generators and transformers including synchronous, asynchronous, DC and special purpose motors, AC, DC generators and autotransformers, CTs, PTs, step-up and stepdown transformers;
2. examine the magnetic field, reluctance of magnetic materials, flux and mmf in magnetic circuits and perform transformer analysis using standard testing procedures including open-circuit and short-circuit tests, voltage regulation, efficiency and circuit analysis involving transformers;
3. examine construction, working principles, characteristics and equivalent circuit of three phase synchronous generators, synchronous motors and induction motors, single phase induction and special purpose motors; and
4. analyse voltage-current characteristics, commutation of DC generators, torque speed characteristics and speed regulation of DC motors.

Course Contents

DC Machine, Introduction to Machinery Principles, Rotational motion, Newton's Law and power relationships, the Magnetic field, Magnetic Circuit with air gap, Faraday's law, Production of induced force on wire, Induced voltage on a conductor moving in a magnetic field, Linear DC machine.; DC Machinery Fundamentals: Simple rotating loop between curved pole faces, Commutation, Construction, Simple armature winding, Armature reaction, Interpoles, compensating winding and brush shifting, Internal generated voltage and induced torque equations of real machines; DC Generators, Introduction, Voltage regulation, Magnetization curve, Equivalent circuits, Working and characteristics of separately excited, shunt, series and compounded generators, Parallel operations of direct current generators; DC Motors, Introduction, Speed regulation, Equivalent Circuits, Working and Characteristics of separately excited, Shunt and Permanent magnet, Working and Characteristics of series and compounded motors, Torque-speed Equations, Efficiency calculations, Stepper Motor and Drive circuit.; AC Machines Topics, Transformer Fundamentals, Importance of transformers, Types and construction, The ideal transformer, Leakage reactance, Theory and operation of single phase transformer, Losses and phasor diagram, the equivalent circuit of a real transformer, No load and short circuit test, the per unit system, the transformer voltage regulation and efficiency, Autotransformers and concept of its power rating advantages, Current transformer (CT) and Potential transformer (PT), Three phase Transformers, Construction of power Transformer, Three phase connections and harmonics suppression, Vector groups, Three phase transformer using two transformers, Transformer ratings and related problems, Transformer Inrush Current, AC Machines Fundamentals, A simple loop in a uniform magnetic field, Review of three phase generation, Proof of the rotating magnetic field concept and its relation with no. of poles, the relationship between electrical and mechanical degree, the relationship between electrical frequency and the speed of the magnetic field rotation Induced voltage and induced torque, Losses and power flow diagram, Voltage regulation and speed regulation.; Synchronous Generator, Construction, Excitation system, Equivalent circuit of Synchronous Generator, Phasor diagram, Power and Torque, Measurement of model parameters, Effect of load changes on a generator, Parallel operation of generators; Synchronous Motor, Basic principle of motor operation, Equivalent circuit, Torque speed characteristics, Power and torque equation, Phasor diagram, the effects of load change, and field current change, Vcurves of synchronous motor and power factor correction, Starting of synchronous motor, Synchronous motor ratings; Three Phase Induction Motor, Construction, Basic concepts and working principles, Synchronous speed, Slip and its effect on rotor frequency and rotor voltage, Equivalent circuit, Power and torque, Torque speed characteristics, losses, efficiency and power factor; Single Phase and Special Purpose Motors, The Universal motor, Introduction to single phase induction motor, Starting single phase induction motors,

Split phase windings, Capacitor start motor, Permanent split capacitor motor, Capacitor start and capacitor run motors, Shaded pole motors, Reluctance motors, the Hysteresis motor.

EEE 311: ELECTRIC CIRCUIT THEORY I

(2 Units C: LH 30)

Learning Outcomes

Students will be able to:

1. state, explain and apply circuit theorems to d.c. 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; and
4. plot Bode diagrams of a given transfer function.

Course Contents

Passive circuit elements: R, L, C, transformers; circuit theorems: Ohm's, KVL, KCL, loop current, node potential, superposition. Network response to step, ramp and impulses.

Network functions: response to exponential, sinusoidal sources. Laplace transform and transfer functions: pole-zero configuration and application in solving circuits, resonance; twoport analysis and parameters.

EEE 321: ANALOGUE ELECTRONIC CIRCUITS

(2 Units E: LH 30; PH 45)

Learning Outcomes

At the end of the study, the student should be able to:

1. understand the basics of semiconductor devices and their applications in different areas;
2. understand different biasing techniques to operate transistor, FET, MOSFET and operational amplifier in different modes; and
3. analyse output in different operating modes of different semiconductor devices.

Course Contents

Single-stage transistor amplifiers using BJT and FET Equivalent circuits and calculation of current gain, voltage gain, power gain, input and output impedance. Operational Amplifiers: Description, parameters and applications. Feedback, broadband and narrowband amplifiers. Power amplifiers. Voltage and current stabilizing circuits. Voltage amplifiers, multi-stage amplifiers using BJTs and FETs.

EEE 322: DIGITAL ELECTRONIC CIRCUITS

(2 Units C: LH 30)

Learning Outcomes:

At the end of the study, the student should be able to:

1. classify, describe and discuss the various logic gates and flip-flops and multivibrators; and
2. design simple logic and sequential circuits using logic gates and flip-flops.

Course contents

Number Systems and Codes. Logic Gate Simplification of Logic expressions using Boolean algebra. Simplification of Logic expressions using Karnaugh Method. Design of combinational circuit. Flip-Flops. Application of Flip-Flops in the design of counter. Registers and timers. Switching and wave shaping circuits. Generation of non-sinusoidal signal (multivibrators). Introduction to ADC and DAC. Design of Logic Gates (Diode, DTL, TTL, ECL etc). Sequential circuits. Introduction to microprocessors.

GET 390: Students Industrial Work Experience II (SIWES II)

(4 Units C: 12 weeks)

Learning Outcomes

At the end of the SIWES, students should be able to:

1. demonstrate proficiency in at least any three softwares in their chosen career choices;
2. demonstrate proficiency in some animation videos (some of which are free on YouTube) in their chosen careers;

3. carry out outdoor hands-on construction activities to sharpen their skills in their chosen careers;
4. demonstrate proficiency in generating data from laboratory analysis and develop empirical models;
5. demonstrate proficiency in how to write engineering reports from lab work;
6. fill logbooks of all experience gained in their chosen careers; and
7. write a general report at the end of the training.

The experience is to be graded and the students must pass all the modules of the attachment and shall form part of CGPA.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (Students are to proceed on three months of work experience i.e. 12 weeks during the long vacation following 300 level). Students are engaged in the more advanced workshops, indoor software design training similar to what they will use in the industry and outdoor construction activities to sharpen their skills. The use of relevant animation videos that mimic industrial scenarios is encouraged. Students are to write a report at the end of the training. As much as possible, students should be assisted and encouraged to secure 3 months' placement in the industry. Examples of outline of activities and experiences to which students are expected to be exposed to earn prescribed credits include: Section A: Welding and fabrication processes, automobile repairs, · lathe machine operations: machining and turning of simple machine elements, such as screw threads, bolts, gears, etc. Simple milling machine operations, machine tool maintenance and trouble-shooting, and wooden furniture making processes. Engineering and Technology Section B: Mechanical design with computer graphics and CAD modelling and drafting. Introduction to Solid works: software capabilities, design methodologies and applications. Basic part modelling: sketching with SolidWorks, building 3D components, using extruded Bose base · Basic assembly modelling, and solid Works drawing drafting. Top-down assembly technique exploded view, exploded line sketch. Introduction to PDMS 3D design software; autoCAD mechanical, SPSS.A comprehensive case study design project. The student should be introduced to the concept of product/component design and innovation and then be given a comprehensive design project.

Examples of projects should include the following:

- a. design of machine components;
- b. product design and innovation;
- c. part modelling and drafting in solid works; and
- d. technical report writing.

BU – GST 400 RELIGION AND SOCIAL ETHICS

(3 Units C:LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Identify three (3) interrelatedness between religion and other social institutions;
2. Explain any five (5) effects of social changes on religion and ethics, since the 18th Century;
3. Evaluate any five (5) roles of religion in human and national development;
4. Explain any five (5) biblical approaches in developing a Christian worldview;
5. Illustrate five (5) uniqueness of the Bible in restoring social ethics and values in the society;
6. Demonstrate competence in providing biblical solution in five (5) areas of moral fluidity and/or ethical dilemma in your discipline and the society;
7. Explain any seven (7) biblical principles in personal, family, and/or professional life.

Course Contents

Religion and Society- Definitions. Culture. Traditions. Religions. Religion and Social changes. Role of Religion. Religion and Knowledge. Religion and Morality. Religion and Family Life. Religion and Gender

Issues. Religion, Transgender and Homosexuality. Religion and Politics. Religion and Corrupt Practices. Religion and Violence. Religion and Environment. Religion, Food and Diet. Religion and Health. Religion, Education and the Bible. Religion and Business. Religion and Social Order. Religion and Sanctity of Life. Merits and Demerits of Religion. Formation of Christian Worldview. Biblical Principles in Personal, Family, and Professional Life – Theory and Practice.

Minimum Academic Standard

Standard University Library with updated textbooks

BU – GST 440 E-PROJECT MANAGEMENT & SIMULATION (1 Unit C: LH 20, PH 40)

Learning Outcomes

Upon completion of the course. students should be able to:

1. explain the project management processes
2. discuss the project management knowledge areas
3. demonstrate the formulas. charts. and theories of project management
4. calculate float for complex project network diagrams
5. memorize the formulas for earned value management
6. compare and contrast processes. knowledge areas. theories. and project management best practices

Course Content

Defining Project Management Fundamentals. Initiating the Project. Planning the Project. Preparing to Develop the Project Schedule. Developing the Project Schedule. Planning Project Costs. Planning Human Resources and Quality Management. Communicating During the Project. Planning for Risk. Planning Project Procurements. Planning for Change and Transitions. Executing the Project. Executing the Procurement Plan. Monitoring and Controlling Project Performance. Monitoring and Controlling Project Constraints. Monitoring and Controlling Project Risks. Monitoring and Controlling Procurements. Closing the Project.

Lab Work: Students will undertake the following tasks in the practical classes; work on stakeholders requirements. Create a risk response team. Create a detailed work plan. Develop communication effective plan. Develop both leadership and technical competencies. Monitor and track progress regularly. Look out for potential risks.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement facilities.

GET 402 ENGINEERING PROJECT I (2 Units C: PH 90)

Leaning Outcomes

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

1. Complete the design phase of a complex engineering problem sourced from industry or community during the SIWES III programme.
2. Demonstrate the connection between engineering product-making and the theoretical courses they have learned following the applicable industry best practices.

Course Contents

In the second semester of the 400-level students, preferably in groups, work from the university on the identified industry or organization to tackle industry complex engineering problems. Theoretical issues may be provided by the department faculty or industry experts. During the vacation, students will now work full time with the organisation/industry on the project as part of the SIWES III. The students can

also go beyond the department and engage in multidisciplinary undertakings. Literature survey, review of existing systems etc. must be achieved to a satisfactory extent.

GET 404 ENGINEERING VALUATION AND COSTING (2 Units C: LH 30)

Learning Outcomes

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

1. Identify at least three (3) objectives of engineering valuation work, valuer's primary duty and responsibility and valuation terminologies.
2. Describe at least four (4) Valuer's obligation to his or her client, to other valuers, and to the society.
3. Demonstrate with example the engineering valuation methods, valuation standards, and practices.
4. Prepare engineering valuation and appraisal reports and review
5. Discuss expert witnessing and ethics in valuation.
6. Determine price, cost, value, depreciation and obsolescence in real property, personal property, personal property, machinery and equipment, oil, gas, mines, and quarries valuation.

CPE 401: MICROPROCESSOR AND EMBEDDED SYSTEMS (3 Units C: LH 45)

Learning Outcomes

Upon the successful completion of the course, students will be able to:

1. develop an ALP in 8085 microprocessor using the internal organisation for the given specification;
2. describe the architecture and functional block of 8051 microcontrollers;
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 Contents

A basic microprocessor system: the CPU, memory, I/O, and buses subsystems, basic operation of a microprocessor system: fetch and execute cycle, the architecture of some typical 8-bit, 16-bit microprocessors (INTEL, MOTOROLA) and their features; programming model in real mode: registers, memory, addressing modes; organisation of the interrupt system, interrupt vectors, and external interrupts, implementation of single and multiple interrupts in real mode; programming model in protected mode: registers, memory management and address translation, descriptor and page tables, system control instructions, multitasking and memory protection, addressing modes, and interrupt system; memory interfacing and address decoding; I/O interfacing: memory mapped i/o, isolated i/o, bus timing, i/o instructions; peripheral devices interfacing: 8255 PPI/6821 PIA, 8251 USART/6821 UART, DMA, Timer/Counter chips, etc; instruction set; assembly language Programming of INTEL and MOTOROLA microprocessors; and discussion of a typical system e.g. IBM PC, Apple Macintosh.

CPE 403: CONTROL SYSTEMS

Units C: LH 30)

Learning Outcomes

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

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 Contents

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. Nichol's chart, compensation techniques; introduction to non-linear systems.

CPE 405: FUNDAMENTALS OF SOFTWARE ENGINEERING (2 Units C: LH 30)

Learning Outcomes

Upon successful completion of this course, the student should be able to:

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, analyse 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 Contents

Introduction to software engineering fundamentals; object-oriented programming; number representations; data structure and algorithms, Abstraction, modules and objects; designing for efficiency; object-oriented software design and implementation.

CPE 411: HARDWARE DESIGN TECHNIQUES AND VERIFICATION (2 Units C: LH 30)

Learning Outcomes

Upon successful completion of this course, students will be able to demonstrate

1. adequate knowledge in digital electronics and digital design concepts;
2. ability to design and implement digital circuits under realistic constraints and conditions;
3. ability to debug, verify, simulate digital circuits;
4. ability to devise, select, and use modern techniques and tools needed for digital design; and
5. ability to work in a team.

Course Contents

Elements of digital computer design; control unit, micro-programming, bus organisation and addressing schemes; micro-processors, system architecture, bus control, instruction execution and addressing modes; machine codes, assembly language and high-level language programming, micro-processors as state machines; microprocessor interfacing: input/output; technique, interrupt systems and direct memory access; interfacing to analogue systems and applications to D/A and A/D converters; system development tools: simulators, EPROM programming, assemblers and loaders, overview of available microprocessor application.

CPE 413: RESEARCH METHODS

(2 Units E: LH 30)

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Describe and explain key research concepts, issues, types of research and the systematic process of research gap identification and documentation and use contexts;
2. Search for, assembling and critically analysing research articles, papers and reports and general literature;
3. Formulate and evaluate research objectives, questions and hypotheses;
4. Developing a research proposal or industry project plan;
5. Identify and develop appropriate data acquisition and analysis methods and instrument;

6. Design/structure and lead the research process using appropriate research designs;
7. Use appropriate tools/techniques, including computer soft- and hardware /technologies to interpret, discuss and report/present the result and conclusions derived from research data analysis in oral or written form; and
8. Prepare/format/package research results/output for academic, journal articles, technical and other reports and exhibitions/fairs (scientific, trade, etc.) as an individual or team/work group.

Course Contents

Origins and definitions of research; problem identification and formulation; research types/design; qualitative, quantitative and mixed methods of research; measurement; sampling; data analysis; interpretation of data and technical report writing; use of encyclopedia, research guides, handbooks, academic databases for computing and computer engineering discipline; use of tools/techniques for research production: referencing formats/styles and software; research management and reporting best practices; plagiarism definitions, types, detection software; basics of document analysis, systematic review and management methods; practical documentation/presentation projects/seminars.

BU-CPE 402 PROTOTYPING TECHNIQUES

(2 Units; C: LH 30; PH 45)

Learning Outcomes

On completion of this course, students should be able to:

1. Explain the five (5) stages and approaches involved in prototyping.
2. Recognize at least five (5) prototyping tools, five (5) techniques and methods.
3. Produce at least three (3) prototypes based on user requirements and feedback.
4. Examine design and technical issues in prototypes.
5. State five (5) importance of prototyping in the product development process.
6. Generate informed design and development decisions based on prototype testing and evaluation.
7. State five (5) benefits and five (5) limitations of different prototyping techniques.
8. Use prototyping to reduce development time and cost.

Course Contents

Introduction to Prototyping. Stages and approaches in Prototyping. Techniques for creating prototypes. Prototyping tools and software. Design and user-centered considerations in Prototyping. Testing and evaluation of prototypes. Iteration and improvement of prototypes. Prototyping for market testing and feedback. Communication and presentation of prototypes. Best practices and guidelines for effective Prototyping. Prototyping in the product development process. Prototyping for innovation and creativity. Limitations and trade-offs of different prototyping techniques. Case studies and examples of successful prototypes. Integration of Prototyping with other design and development processes. Emerging trends and future directions in Prototyping. Practical projects and hands-on experience in creating and evaluating prototypes.

BU-CPE 406 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

(2 Units; C; LH 45)

Learning Outcomes

On completion of this course, students should be able to:

1. Discuss four (4) basic concepts and techniques of AI and ML
2. State fifteen (15) AI applications and their impact on society
3. Distinguish five (5) AI/ML algorithms and three (3) models
4. Develop skills in using six (6) AI/ML tools and techniques for real-world problems
5. Awareness of the ethical and social implications of AI and ML

Course Contents

Introduction to AI and its history. Overview of ML techniques and algorithms. Linear Regression, Logistic Regression. Naive Bayes algorithms. Decision Trees. Random Forest. Support Vector Machines. Neural Networks. Convolutional Neural Networks, Recurrent Neural Networks. Unsupervised learning

techniques such as Clustering and Dimensionality Reduction. Reinforcement learning and its applications. Natural language processing and sentiment analysis. Image and speech recognition. Ethics and social implications of AI and ML. Overview of popular AI and ML tools and frameworks. Practical implementation of ML algorithms using programming languages such as Python and R. Hands-on projects to develop AI and ML models. Overview of deep learning and its applications. Generative Adversarial Networks and their applications. Introduction to convergent technologies such as Internet of Things, 5G, and blockchain. Case studies and real-world applications of AI and ML in various industries.

BU-CPE 407 DATA COMMUNICATION AND NETWORKS (3 Units; C; LH 45; PH NIL)

Learning Outcomes

On completion of this course, students should be able to:

1. Explain the four (4) fundamentals of data communication and computer networks.
2. Discuss six (6) types of networks and their applications.
3. Understand five (5) communication protocols and their role in the functioning of computer networks.
4. Discuss four (4) network topologies and their impact on network performance and design.
5. Illustrate network addressing and routing and their impact on the performance of computer networks.
6. Explain seven (7) network security techniques and their importance in protecting data transmitted over the network.
7. Define cloud computing and its role in distributing data and processing power over a network.
8. Discuss four (4) the different components of a computer network and their roles.
9. Understand data transmission techniques and their impact on network performance.
10. Discuss three (3) network performance optimization techniques, six (6) tools and their impact on the functioning of computer networks.
11. Identify various network services and applications available in Nigeria. Their roles in facilitating communication and data exchange.

Course Contents

Overview of computer networks and data communication. Network types and topologies. Network protocols. Network hardware components. Data transmission techniques. Network security. Wireless networks. Network performance and optimization. Network addressing and routing. Network services and applications. Distributed networks and applications. Cloud computing and storage. Network standards and protocols. Network management and administration. Network design and implementation. Network troubleshooting and maintenance. Emerging trends and technologies in data communication and networks.

BU- GEG 403 SYSTEMS DYNAMICS AND SIMULATION (3 Units C: LH 45)

Learning Outcomes

On the completion of the course, the students should be able to:

1. Explain with five (5) detailed examples the dynamics of a problem.
2. Formulate four (4) hypotheses about systems behaviour.
3. Apply with at least five (5) examples the graphical stock and flow structure and the causal loop diagrams as tools for effective modeling and simulation of dynamic engineering system.
4. Develop three (3) models that reproduce the structure-behaviour a real-life engineering problem using System Dynamics modeling platforms like VENSIM, STELLA, or POWERSIM.
5. Produce one (1) term paper on the functionality, reliability and usefulness of the model after development.

Course Contents

The purpose of modeling. Steps of the modeling process. Problem articulation. Formulating a dynamic hypothesis. Formulating a simulation model. Testing and design policy and evaluation. The concept of feedback. Modeling feedback with causal loop diagrams (CLDs). Simple structures: positive loop,

negative loop, coupled loops, loop polarity, and shifts in loop dominance. Stocks and flows. The right level of aggregation. Model formulation (rate equations, auxiliary equations, table functions, levels, and delays). Interactions of the fundamental modes of dynamic behavior (S-shaped growth. S-shaped growth with overshoot, overshoot and collapse, stasis or equilibrium, randomness, chaos). Understanding of the model behavior. System guiding policy analysis. Case studies: modeling the environment, power supply system, water supply system, transportation system, innovation diffusion, growth of new products, urban planning, solid waste, and public health management, renewable energy, automation and control system, mechatronics, robotics, climate change, heating systems, sustainable fuels, etc. Minimum Academic Standards 37 The course is comprised of lectures, seminars, group discussions, students' presentations, modeling sessions and individual assignments/papers. An active participation and overall attendance rate of 80% in scheduled sessions is required, and in the group discussions, students' presentations, and seminars, and is required in those sessions. Simulation Software. VENSIM DSS, STELLA OR POWERSIM.

BU- GEG 404 NUMERICAL METHODS

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course the students should be able to:

1. Solve nonlinear polynomial equations in determining the roots by applying numerical methods such as Bisection, Newton Raphson method, Secant method.
2. Evaluate the Linear Systems of Equations by applying Gaussian Elimination, LU Decomposition, Gaius Seidel Methods
3. Apply Linear, Quadratic and Cubic Langrangian Interpolation Formulae to solve interpolation problems.
4. Solve Linear and Nonlinear Ordinary and Partial Differential Equations by applying Euler method, Runge-Kutta
5. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Difference Method
6. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Volume Method
7. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Element Method Rayleigh Ritz
8. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Galerkin Finite Element Method
9. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Explicit, Semi Implicit and Implicit Finite Volume Method

Course Contents

Numerical Solution to Root Finding of Nonlinear Polynomial Equations – Bisection. Newton Raphson method and Secant method. Linear Systems of Equations – Gaussian Elimination. LU Decomposition and Gaius Seidel Methods. Langrangian Interpolation Formulae – Linear. Quadratic and Cubic. Numerical Solution to Ordinary Differential Equations – Euler method. Runge-Kutta. Numerical Solution to Ordinary Differential Equations Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Ordinary Differential Equations Three Dimensional Problems Using Finite Difference. Numerical Solution to Partial Differential Equations of Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Partial Differential Equations of Three – Dimensional Problems Using Finite Difference Method. Alternating Direct Implicit Three Dimensional Finite

Difference Method (FDM). Numerical Solution to 35 Ordinary and Partial Differential Equations Using Finite Elements. Finite Volume Methods: Ritz. Finite Element Methods Rayleigh Ritz. Galerkin Finite Element Method. Explicit, Semi Implicit and Implicit Finite Volume Method.

GET 490: STUDENTS INDUSTRIAL WORK EXPERIENCE III (8 Units C: 24 weeks)

Learning Outcomes

Students on Industrial Work Experience Scheme (SIWES) are expected to:

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 devise impactful solutions to them; and
5. exploit the opportunity to improve and utilise their acquired critical thinking and innate creativity skills, during the program and SIWES Seminar presentation respectively.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (24 weeks from the end of the first semester at 400-Level to the beginning of the first semester of the following session. Thus, the second semester at 400-Level is spent in industry). Each student is expected to work in a programme related industry, research institute or regulatory agencies etc, for a period of 6 months under the guidance of an appropriate personnel in the establishment but supervised by an academic staff of the Department. On completion of the training, the student submits the completed Log book on the experience at the establishment., Also, there will be a comprehensive report covering the whole of the student's industrial training experiences (GET 290, GET 399 and GET 499), on which a seminar will be presented to the Department for overall assessment.

BU – GST 500 SEMINAR ON ADVENTIST HERITAGE (3 Units; C; LH 30; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the four (4) dimensions/emphasis of Adventist education in relation to faith integration in teaching, learning, and life.
2. State at least seven (7) contributions of Ellen White to the Seventh-day Adventist Church
3. Assess five (5) benefits of Literature Ministry in relation to the Seventh-day Adventist Church mission
4. Analyze the meaning and implications of the Three Angels Messages
5. Assess Ellen G. White's counsels in relation any three (3) contemporary issues
6. Evaluate five (5) areas of Ellen White's counsels on Family life
7. Enumerate five (5) major contributions of Health Reforms, Health Institutions, and Medical Ministry to the growth of the Seventh-day Adventist Church
8. Develop at least two (2) community-based projects focused on service to humanity

Course Contents

Philosophy of Adventist Education. Harmonious Development. Biblical Foundation for Faith Integration. The Three Angels Messages. Spirit of Prophecy and Seventh-day Adventist Church. Ellen G. White's Conversion Story. E.G. White's Relationship with Jesus Christ. E.G. White's Writings and Contemporary Issues. Publishing Ministry. Family Life. Child Guidance. Health Ministry in Seventh-day Adventist Church. Health Reforms. Health Institutions. Healthy living. Alternative medicine. Medical Missionary. Health and Community Service. Dynamics of Community-based Projects. Benefits and Assessment of Community-based Projects.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts; Conferences/Unions/Division's Health and Publishing Departments of Seventh-day Adventist Church.

BU – GST 540 INTRODUCTION TO DIGITAL MARKETING (1 Units; C; LH 15; PH 45)

Learning Outcomes

- i. Be able to develop and execute a marketing plan. incorporating all elements of the marketing mix. segmentation and positioning strategies and other elements.
- ii. Have an understanding of the role of both digital and traditional media in marketing. and the intersection of online and offline strategies and tactics.
- iii. Be able to guide the development of a digital presence from a marketing point of view.
- iv. Be proficient in marketing analytics and quantitative evaluation of the marketing environment.
- v. Have working knowledge of website design and development.
- vi. Familiarize oneself with the fundamentals of social media & digital marketing
- vii. Learn how to use existing social & digital marketing tools to achieve marketing and organizational objectives
- viii. Understand the concepts for creating engaging content & drive online campaigns
- ix. Create a framework to audit the current state of the digital assets
- x. Be able to develop and execute a marketing plan. incorporating all elements of the

Course Content

Digital Marketing Strategy: How the Internet works. understanding marketing strategy. the building blocks of marketing strategy. Crafting a digital marketing strategy.

Market Research: The importance of market research. Key concepts in market research. Online research methodologies. Justifying the cost of research.

Content Marketing Strategy: Defining Content marketing. Strategic building blocks. Content creation. Content channel distribution.

User Experience Design: Understanding UX design. Core principles of UX design. Mobile UX. Step-by-step guide to UX design.

Web Development and Design: Web development. Mobile development. Step-by-step guide to building a website.

Writing for Digital: Writing for your audience. Types of web copy. HTML for formatting. SEO copywriting. best practices for online copywriting.

Customer Relationship Management: A CRM model. understanding customers. CRM and data. the benefits of CRM. Social CRM. Step-by-step guide to implementing a CRM strategy.

Learning Outcomes

At the end of the course, students should be able to:

1. explain the basics of project management as it relates to the Engineering discipline;
2. demonstrate knowledge and understanding of engineering, management and financial principles and apply these to their own work, as a member and/or leader in a team, to manage projects and in multi-disciplinary environments;
3. conduct, manage and execute projects in multi-disciplinary areas;
4. possess the skills needed for project management; and
5. work within the budget when executing a project for proper management.

Course Contents

Project management fundamentals – definitions, project environment, nature and characteristics, development practice, management by objectives, and the centrality of engineering to projects, infrastructures, national and global development. The scope of project management – organisational, financial, planning and control, personnel management, labour and public relations, wages and salary administration and resource management. Identification of project stakeholders; beneficiaries and impacted persons – functions, roles, responsibilities. Project community relations, communication and change management. Project planning, control and timeliness; decision making, forecasting, scheduling, work breakdown structure (WBS), deliverables and timelines, logical frameworks (log frames), risk analysis, role of subject matter experts (SMEs), role conflicts; Gantt Chart, CPM and PERT. Optimisation, linear programming as an aid to decision making, transport and materials handling. Monitoring and Evaluation – key performance indices (KPIs); methods of economic and technical evaluation. Industrial psychology, ergonomics/human factors and environmental impact considerations in engineering project design and management. Project business case - financial, technical and sustainability considerations. Case studies, site visits and invited industry professional seminars. General principles of management and appraisal techniques. Breakthrough and control management theory; production and maintenance management. Training and manpower development. The manager and policy formulation, objective setting, planning, organising and controlling, motivation and appraisal of results.

GET 502 ENGINEERING LAW

(2 Units C: LH 30)

Learning Outcomes

Students will be able to:

1. Describe and explain the basic concept, sources and aspects of law;
2. Describe and explain the major differences between the various categories of law, courts and legal jurisdictions;
3. Describe and explain legal principles and their application in professional engineering design and management services and their professional liability implications; and
4. Develop reasoned analysis of real-life or hypothetical engineering scenarios using the legal principles undertake critical analysis of reliable information to develop, and practically present technical reports for use in varying judicial/quasi-judicial settings including as an expert witness.

Course Contents

Common Law: its history, definition, nature and division. Legislation, codification interpretation. Equity: definition and its main spheres. Law of contracts for Engineers: Forms of contract and criteria for selecting contractors; offer, acceptance, communication termination of contract. Terms of Contracts; suppliers' duties – Damages and other Remedies. Termination/cancellation of contract Liquidation and Penalties; exemption clauses, safety and risk. Health and Safety. Duties of employers towards their employees. Duties imposed on employees. Fire precautions act. Design for safety. General principles of

criminal law. Law of torts: definition, classification and liabilities. Patents: requirements, application, and infringement. Registered designs: application, requirements, types and infringement. Company law. Labour law and Industrial Law. Business registration.

CPE 501: TESTING, RELIABILITY AND MAINTAINABILITY (2 Units C: LH 30)

Learning Outcome

Upon successful completion of this course, the student will be able to:

(Knowledg-Based)

1. apply engineering techniques to prevent or reduce frequency of failures;
2. identify and correct the causes of the failures on engineering systems;
3. apply engineering techniques to estimate the reliability of new designs and analyse reliability data; and

(Skills)

1. predict expected life of the specific component, product or system; and establish risk analysis and quality control on engineering systems.

Course Contents

Introduction to reliability, maintainability, availability, elementary reliability theory; application to power systems and electronic components; test characteristics of electrical and electronic components; types of fault; designing for higher reliability; packaging, mounting, ventilation; protection from humidity, dust.

CPE 502: DIGITAL SIGNAL PROCESSING (3 Units C: LH 45)

Learning Outcomes

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

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. Engineering and

Course Contents

Discrete signals and Z-transform, digital fourier transform, fast fourier transform; the approximation problem in network theory; synthesis of low-pass filters; spectral transforms and their application in synthesis of high-pass and band-pass filters; digital filtering, digital transfer function aliasing, one-dimensional recursive and non-recursive filters; computer techniques in filter synthesis, realisation of filters in hardware and software; and basic image processing concepts.

CPE 511: MACHINE LEARNING AND APPLICATIONS (3 Units C: LH 45)

Learning Outcomes

On the successful completion of this unit, students should be able to:

1. identify the characteristics of datasets and compare the trivial data and big data for various applications;
2. select and implement machine learning techniques and computing environment that are suitable for the applications under consideration;
3. solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues;
4. understand and apply scaling up machine learning techniques and associated computing techniques and technologies;
5. recognise and implement various ways of selecting suitable model parameters for different machine learning techniques; and

6. integrate machine learning libraries and mathematical and statistical tools with modern technologies like hadoop and mapreduce.

Course Contents

Introduction to machine learning; ; introduction to R or Python for machine learning: statistics for analytics: descriptive statistics, inferential statistics, estimation and hypothesis testing, ANOVA; machine learning: unsupervised learning – clustering, supervised learning – classification, decision trees, random forest, and model performance measures.

BU-CPE 500 OPERATING SYSTEMS

(2 Units; C; LH 30; PH NIL)

Learning Outcomes

On completion of this course, the students should be able to:

1. Explain five (5) operating system concepts such as processes, threads, memory management, file systems, and device management.
2. Discuss three (3) different types of operating systems.
3. Analyse the Six (6) different operating systems in terms of performance, reliability, and security.
4. Understand the boot process and system initialisation.
5. Devise three (3) types of file systems and their features.
6. Define device management and I/O subsystems.
7. Discuss four (4) memory management algorithms.
8. Explain three (3) aspects of security and protection mechanisms in operating systems.
9. Describe one (1) concurrent programming and synchronization primitives.
10. Devise simple operating systems.

Course Contents

Introduction to operating systems and their functions. Types of operating systems and their classification. Operating system structures and components. Process and thread management. Memory management and virtual memory. File systems and storage management. Input/Output (I/O) systems and device management. Interprocess communication and synchronization. Deadlocks and starvation. Security and protection mechanisms in operating systems. Real-time and embedded operating systems. Case studies of popular operating systems such as Windows, Linux, and Unix. Design and implementation of simple operating systems. Future trends in operating systems and their implications. Operating system performance analysis and optimization. Advanced topics in operating systems – distributed and cloud computing. Operating system security and threat analysis.

BU-CPE 502 COMPUTER GRAPHICS AND ANIMATION

(3 Units; C; LH 30; PH 45)

Learning Outcomes

On completion of this course, students should be able to:

1. Discuss the seven (7) fundamental concepts and principles of computer graphics.
2. Create and render at least two (2) 2D and 3D graphics and animation techniques.
3. Practice one (1) computer graphic software, tools, and the programming languages.
4. Identify one (1) role of graphics in multimedia and game development.
5. Describe the use of computer graphics in scientific visualization and simulations.
6. Illustrate the twelve (12) animation principles, key frame animation and motion graphics.
7. Understand the basics of human-computer interaction and user experience design.
8. Develop one (1) interactive applications and games.
9. Discuss the ethical and legal issues related to computer graphics and animation.
10. Explain one (1) production process for creating graphics and animations for film, television and digital media. And the steps.

Course Contents

Introduction to computer graphics and animation. Fundamentals of computer graphics including color models and image representation. 2D graphics, including raster graphics and vector graphics. 3D graphics, including modelling, rendering, and shading techniques. Animation principles, including keyframe animation, motion graphics, and special effects. Motion capture and character animation techniques.

Graphics programming, including OpenGL and DirectX. Game engine design and development. Interactive graphics, including user interaction and event handling. Image and video processing, including image compression and video codecs. Virtual and augmented reality technologies and applications. Computer vision and image analysis. Web graphics, including HTML5 and WebGL. Mobile graphics and game development. Animation production pipeline. Workflow management. Professional practices in computer graphics and animation, including project management, teamwork, and portfolio creation. Trends and emerging technologies in computer graphics and animation, including real-time ray tracing and virtual production.

Minimum Academic Standard

A well- equipped computer laboratory with graphics software.

BU-CPE 503 COMPUTER SECURITY TECHNIQUES (2 Units; C; LH 45; PH NIL)

Learning Outcomes

On completion of this course, students should be able to:

1. Explain four (4) types of computer securities
2. Identify five (5) types of cyber attack
3. Demonstrate an understanding of computer security concepts and their applications
4. Evaluate five (5) security risks associated with different types of digital assets and systems
5. Implement five (5) security measures and techniques to protect digital information and systems
6. Interpret security policies, regulations, and standards, and their impact on securing digital assets
7. Design, implement, and test five (5) security strategies and solutions to defend against security threats
8. Utilize ethical hacking and penetration testing tools to assess the security of networks and systems
9. Continuously enhance their knowledge and skills in the field of computer security through self-study and professional development.

Course Contents

Introduction to computer security and its importance. Types of security threats – viruses, malware, and cyberattacks. Cryptography and encryption techniques. Access control and authentication methods. Firewalls and intrusion detection systems. Security incident management. Network security protocols – including SSL/TLS and IPsec. Operating system security – Windows and Linux security. Secure coding practices. Software development life cycle. Database security and data privacy. Mobile device and cloud security. Information security management and compliance regulations – PCI-DSS and ISO 27001. Ethical hacking and penetration testing methods. Incident response. Disaster recovery planning. Social engineering and phishing attacks. Physical security and environmental threats. Emerging trends in computer security – including AI-based security solutions. Blockchain technology. Legal implications of computer security. Ethical and social implications of computer security.

BU-CPE 505 CYBERPRENEURSHIP AND CYBERLAW (2 Units; C; LH 30; PH NIL)

Learning Outcomes

On completion of this course, students should be able to:

1. Understand the legal and regulatory framework for cyberpreneurship and cyberlaw.
2. Know about cybercrime and its impact on businesses and individuals.
3. Familiarise with intellectual property rights and how they apply to the digital world.
4. Identify and assess legal risks in the development and operation of online businesses.
5. Understand privacy laws and regulations and their impact on cyberpreneurship.
6. Know about e-commerce laws and regulations, including payment systems and consumer protection.
7. Understand the responsibilities and liabilities of website owners and operators.
8. Familiarise with dispute resolution mechanisms for online businesses.

9. Understand cyber-security and cyber-insurance for cyberpreneurship.
10. Know about ethical considerations in the use of technology in businesses and in society.

Course Contents

Introduction to cyberpreneurship and e-commerce. Business models for online businesses. Entrepreneurship and innovation in the digital economy. Overview of cyberlaw and intellectual property. Online privacy and data protection. Electronic signatures and digital contracts. Legal aspects of e-commerce transactions. Domain name disputes and cyber-squatting. Liability of internet service providers. Cybercrime and cyber security. Online payment systems and digital currencies. Regulation of e-commerce and digital markets. Emerging trends in cyberpreneurship and cyberlaw. Cyberpreneurship case studies and best practices. Ethics and social responsibility in the digital economy. Business plan development for cyberpreneurship. Future trends and opportunities in cyberpreneurship and cyberlaw.

BU-CPE 507 FUNDAMENTALS OF INTERNET OF INTERNET OF THINGS (IOT)

(2 Units; C; LH 30; PH NIL)

Learning Outcomes

On completion of this course, students should be able to:

1. Understand the basis of IoT.
2. Familiarise with the real-world applications of IoT.
3. Know the relationship between the IoT and Machine Learning.
4. Interpret the IoT case studies in the real-world applications.
5. Explain the relationship between IoT and Artificial Intelligence (AI).

Course Contents

Introduction to Internet of Things (IoT). IoT architecture and its components. IoT device and sensor design. IoT communication protocols: MQTT, HTTP, CoAP, and IoT security and privacy. IoT data management and storage. IoT network and cloud infrastructure. IoT security and privacy. IoT data analytics and visualization. IoT application development and deployment. IoT case studies and real-world applications. Introduction to smart cities and smart homes. IoT and machine learning. IoT and artificial intelligence. The use of big data technologies and machine learning algorithms for IoT. IoT and edge computing. IoT and 5G technology. Future trends and developments in IoT.

GET 590: Final Year Project

(6 Units C: LH 270 PH)

Learning Outcomes

The student(s) will develop a technology and/or system to solve a known and significant computer engineering problem and design, and if possible/practicable, build/produce/ manufacture some relevant new hardware/device(s) representing the solution using the skills acquired in the computer engineering programme.

Course Contents

Individual student or group of students' projects undertaken to deepen knowledge, strengthen practical experience and encourage creativity, entrepreneurship and independent/team work (as may be the case). The project ends in a comprehensive written report of a developed system, and/or product/service and oral presentation/defense before a panel of assessors one of whom must be external to the University awarding the computer engineering degree.

CPE 505: DIGITAL SYSTEM DESIGN WITH VHDL

(2 Units E: LH 30)

Learning Outcomes

On completion of this course, the students will be able to:

1. explain VHDL as a programming language;

2. design the combinational and sequential logic circuits using VHDL;
3. design programmable logic devices (PLDs) and networks of arithmetic operations;
4. gain proficiency with VHDL software package and utilise software package to solve problems on a wide range of digital logic circuits.

Course Contents

Finite state machine: definition, mealy and Moore models, state diagram, state table, transition table; sequential circuits design using flip-flops, asynchronous and synchronous circuit design; algorithm state machine; design examples and exercises; structured design: design constructs, design levels, geometry-based interchange formats, computer-aided electronic system design tools, schematic circuit capture, hardware description languages, design process (simulation, synthesis), structural design decomposition; introduction to VHDL: VHDL language abstractions, design hierarchies, VHDL component, lexical description, VHDL source file, data types, data objects, language statements, concurrent VHDL, sequential VHDL, advanced features of VHDL (library, package and sub-programmes); structural level modelling, register-transfer level modelling, FSM with data path level modelling, algorithmic level modelling; introduction of ASIC, types of ASIC, ASIC design process, standard cell ASIC synthesis, FPGA design paradigm, FPGA synthesis, FPGA/CPLD architectures; VHDL Design: top-down design flow, verification, simulation alternatives, simulation speed, formal verification, recommendations for verification, writing RTL VHDL code for synthesis, top-down design with FPGA; VHDL synthesis, optimisation and mapping, constraints, technology library, delay calculation, synthesis tool, synthesis directives; and computer-aided design of logic circuits.

CPE 514: PROFESSIONAL PRACTICE AND ETHICS

(2 Units E: LH 30)

Learning Outcomes

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

1. have a holistic picture of professional practice in computer engineering;
2. be abreast of the ethical and professional issues and landmines inimical to their practice and how to navigate them;
3. be totally ready (professionally, technically, legally and emotionally) for any professional entrepreneurial, financial and managerial challenges they may encounter; and
4. be abreast of the standards, codes and intellectual property implications of and values associated with, professional practice.

Course Contents

Engineering profession: structure and specializations (Nigeria and abroad), engineering basics, development of engineering profession, ethics and computer engineering, strands in ethical thinking, organisations and their structures: limited liability companies, private and public, partnerships, sole traders, special features of limited companies, responsibilities of directors; company finance: the need for capital; investment and working capital; sources of funds; equity capital and loan capital, cash flow and its importance, costing: fixed costs and variable costs; overheads; opportunity costs; depreciation; problems of cost allocation; budgeting; assessment of capital investment; discounted cash flow analysis, with particular reference to investment in software tools and new product development; financial accounts: balance sheets, profit and loss accounts, cash flow statements; the treatment of software in company accounts; ownership of rights in software as goodwill; anatomy of software house: the company, company structure, management of staff, producing of budget, monitoring financial performance, producing budgets, computer contracts and intellectual property rights: the nature and types of intellectual property; intellectual property law (confidentiality, copyright, trademarks, and patents) and implications for the computing, computer engineering and software industry; computer misuse and criminal law: computing and criminal activity, reform and criminal law, categories of misuse, computer fraud, unauthorized access; data protection: data protection and privacy, the impact of the internet; sociology of data management/processing: generation, users, regulation/control and general management; Professional and industry codes of conduct (local and international)

BU-CPE 511 ROBOTICS AND AUTOMATION (2 Units; E; LH 30; PH 45)

Learning Outcomes

On completion of this course, students should be able to:

1. Design and build robotic systems
2. Program and control robotic systems
3. Understand the applications and impact of robotics and automation
4. Knowledgeable in sensors and actuators used in robotics
5. Apply artificial intelligence in robotic systems
6. Understand the different types of robots and their functions
7. Troubleshoot and debug robotic systems
8. Understand the ethical and social implications of robotics and automation
9. Keep up-to-date with the latest developments and innovations in robotics and automation
10. Analyse and evaluate the economic impact of robotics and automation on society and industry

Course Contents

Overview of Robotics and Automation. Sensors and Actuators. Robotic Mechanisms. Robot Kinematics and Dynamics. Robot Programming and Control. Robotics and AI. Path Planning and Navigation. Vision Systems. Human-Robot Interaction. Robotics Applications. Automation Systems. Control Systems. Robotics Ethics and Safety. Emerging Trends in Robotics and Automation. Robotics Project Development. Simulation and Testing. Case Studies of Robotics and Automation in Industry and Society.

BU-CPE 512 DESIGN & INSTALLATION OF ELECTRICAL & ICT SERVICES

(2 Units; E; LH 30; PH 45)

Learning Outcomes

On completion of this course, students should be able to:

1. Install some electrical and ICT equipment's using electrical/ICT tools
2. Understand health and safety act in Nigeria at work places
3. Understand the applications and impact of electricity supply regulations
4. Knowledgeable in computer systems power maintenance factors and coefficient power utilization
5. Understand the type of light sources and calculation of lighting requirements
6. Understand the different types of installation materials, cables, junction box, terminations & joints
7. Understand electrical installation design in domestic, commercial and industry
8. Knowledgeable in conduiting, trucking and earthing for installed equipment protection
9. Understand Faraday cage, earth electrode resistance, earth fault loop impedance
10. Keep up-to-date with the latest developments in ICT services: NCC and FCC code of practice and standards
11. Design and installation of computer networking and telecommunication such as VSAT & Satellite
12. Understand the preparation of bill of engineering measurement
13. Analyse and evaluate the contract bidding and consultancy

Course Contents

Electrical Installation: Introduction to health and safety at work act in Nigeria. Electrical safety. First aid. Electricity supply regulations. Lighting and Illumination: Luminous intensity and flux. Maintenance factor. Coefficient of utilization. Types of light sources. Calculation of lighting requirements. Glare. Stroboscopic effect. Installation materials, cables, junction box, terminations, joints. Conduits and conduiting. Truck and trucking. Electrical Installation design in domestic, commercial and industry. Alarm and emergency systems. Earthing and Protection. Purposes of earthing. Faraday cage. Rod electrodes. Earth electrode resistance. Earthing system. Earth fault loop impedance. ICT services: NCC

and FCC codes of practice and standards. Telecommunication design and installation: Satellite, VSAT, etc. Telephone design and installation. Computer networking design and installation. Wireless LAN design and installation. Preparation of Bill of Engineering Measurement Evaluation. Contract bidding. Consultancy.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING



Olubunmi Onadayo ONATOYINBO
Ag. Head of Department

BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING (B.ENG.)

OVERVIEW

Electrical and Electronic engineers are involved in channeling natural resources into various end-uses such as in heating, lighting, home appliances, consumer products, computing, sensing, control, and communication systems. They contribute to the development of systems and devices for power, instrumentation, measurement, communication engineering, management, manufacturing, transportation, etc. They are primarily concerned with the processes of generation, transmission, transformation, control, and utilization of energy and/or information.

The curriculum exposes students to the breadth of electrical and electronic engineering and allows them to pursue electives in several areas including Electrical power and Machine, Electronics and Telecommunications, Computer and control systems. Hence, the students are expected to take courses in the following areas:

1. Electrical power and Machine option emphasizes the design and applications of motors, generators, transformers, distribution systems, high-voltage devices, and power electronic;
2. Electronics and Telecommunication option covers concepts required for the characterization and manipulation of information-bearing signals, modulation systems, wireless networks, image processing, and signal detection software and hardware. These courses provide instructions in the interaction, propagation, and transmission of high frequency waves and signals through space and in conductors. Topics include grounding and shielding, antennas, microwaves, and systems
3. Computer and Control option emphasizes the design and application of circuits and systems to automatically monitor and regulate operation of devices, machines, and processes. Advanced technologies using digital control, intelligent processing, neural networks, and programmable logic controllers are included;

PHILOSOPHY

This programme is to produce graduates with high academic and soft skills competence, capable to adequately participate, transform and impact on the Engineering and allied industries in consonance with

National and Global community values, including National Policy on Industrialization and Self-Reliance. Also, to train students to explore and make relevance to the importance of efficient and sustainable solutions for Electrical and Electronics Engineering challenges, such as achieving sustainable electricity generation, secure distribution, and intelligent communication systems.

OBJECTIVES

- i. To achieve international standard of quality education in molding the young engineers into full-fledged future professionals.
- ii. To impart quality education for effective learning in terms of teaching, workshop practices and research.
- iii. To train the students in achieving and practicing technical skills in identifying, analysing and solving complex problems and issues related to Electrical Electronics Engineering.
- iv. Practice Electrical and Electronics Engineering with an awareness of and commitment to ethics and social responsibility, sustainability and diversify both as individual and as in team works.

VISION STATEMENT

Towards a global knowledge hub, striving continuously in pursuit of knowledge per excellence in electrical electronic engineering education, entrepreneurship and innovation.

MISSION STATEMENT

To nurture students with creativeness, innovativeness and entrepreneurship skills to develop out-of-the-box thinking in response to the needs of the related industry like communications, power and others.

ADMISSION REQUIREMENTS

Candidates are admitted into the degree programme in any 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 five year degree programme, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy all the following conditions –

- a. A minimum of Credit level (C6) pass in at least 5 subjects, including English Language; Mathematics, Physics, Chemistry and any other acceptable science subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.

It is also desirable for candidates to have Further Mathematics and Technical Drawing at credit levels. This will be an added advantage.

- b. Acceptable score in the Unified Tertiary Matriculation Examinations (UTME). The subjects shall be Mathematics, Physics, Chemistry and English Language.
- c. In addition, candidates with acceptable Unified Tertiary Matriculations Examinations (UTME) results will further be screened to ascertain suitability for admission into Babcock University.

Direct Entry Mode

For four year Direct Entry, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy the following three conditions –

- a. Candidates must satisfy the 5 credits ‘O’ Level requirements in English Language; Mathematics, Physics, Chemistry and any other one relevant subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.
- b. 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 through Direct Entry. Candidates who have good National Diploma (ND) result, minimum of Upper Credit in relevant Engineering Technology programmes from recognized institution may also be considered for admission into 200 level.
- c. Direct entry candidates must also satisfy the UTME requirements.

COURSE DURATION

This undergraduate programme will runs for 10 semesters (5 academic sessions) for full time and 8 semesters (4 academic sessions) for Direct Entry students.

GRADUATION REQUIREMENTS

The following regulations shall govern the conditions for the award of a honours degree in Engineering and Technology:

1. candidates admitted through the UTME mode shall have registered for a minimum of 150 and maximum of 180 units of courses during the 5–year engineering degree programme. Such candidates shall have spent a minimum of ten academic semesters;
2. candidates admitted through the Direct Entry mode shall have registered for a minimum of 120 and a maximum of 150 units of courses during a 4–year engineering degree programme. Such candidates shall have spent a minimum of eight academic semesters;
3. candidates admitted through the Direct Entry mode at 300-Level shall have registered for a minimum of 90 and a maximum of 120 units of courses during a 3–year engineering degree programme. Such candidates shall have spent a minimum of 6 academic semesters;
4. The minimum and maximum credit load per semester is 16 and 24 credit units respectively; a student shall have completed and passed all the Courses registered for, including all compulsory courses and such elective /optional courses as may be specified by the university/faculty or department; obtained a minimum Cumulative Grade Point Average (CGPA) specified by the university but not less than 2.00; and

5. a student shall also have earned the 11 credit units of Students Industrial Work Experience Scheme (SIWES), 8 credit units of University General Study courses and four credit units of Entrepreneurship courses.

GLOBAL COURSE STRUCTURE

LEVEL	GST/ENT	BASIC SCIENCE	DISCIPLINE GET/GEG	DEPARTMENTAL COURSES (EEE TEL)	SIWES	TOTAL
100	11	25	3	2	-	41
200	11	-	28	6	3	48
300	9	-	21	12	4	46
400	4	-	10	15	4	33
500	4	-	5	24	-	33
TOTAL	39	25	67	59	11	201

LEVEL	1ST SEMESTER	2ND SEMESTER	TOTAL
100	18	23	41
200	24	24	48
300	24	22	46
400	17	16	33
500	16	17	33
TOTAL	99	102	201

BACHELOR OF ELECTRICAL ELECTRONICS ENGINEERING (B.ENG.)

100 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
GST 111	Communication in English	C	2	-
GST 112	Nigerian Peoples and Culture	C	-	2
BU – GST 105	Use of Library and Study Skills	C	2	-
BU – GST 112	Health Principles	C	-	1
BU – GST 120	ICT Fundamentals & Office Productivity Management	C	1	-
BU – GST 126	Life and Teachings of Christ the Messiah	C	-	3
CHM 101	General Chemistry I	C	2	-
CHM 102	General Chemistry II	C	-	2
CHM 107	General Practical Chemistry I	C	1	-
CHM 108	General Practical Chemistry II	C	-	1
MTH 101	Elementary Mathematics I	C	2	-
MTH 102	Elementary Mathematics II	C	-	2
MTH 103	Elementary Mathematics III	C	2	-
PHY 101	General Physics I	C	2	-
PHY 102	General Physics II	C	-	2
PHY 103	General Physics III	C	2	-
PHY 104	General Physics IV	C	-	2
PHY 107	General Practical Physics I	C	1	-
PHY 108	General Practical Physics II	C	-	1
STA 112	Probability I	C	-	3
GET 101	Engineer in Society	C	1	-
GET 102	Engineering Graphics and Solid Modelling I	C	-	2
EEE 102	Introduction to Electrical and Electronics Engineering	C	-	2
	TOTAL (41 Credits)		18	23

BACHELOR OF ELECTRICAL ELECTRONICS ENGINEERING (B.ENG.)

200 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
ENT 211	Entrepreneurship and Innovation	C	2	-
GST 212	Philosophy, Logic and Human Existence	C	-	2
BU – GST 200	Communication in French	C	-	1
BU – GST 215	Adventist Heritage	C	3	-
BU – GST 220	Origin of Science	C	-	1
BU – GST 221	Introduction to Agriculture	C	1	-
BU – GST 290	Introduction to Data Analytics	C	1	-
GET 201	Applied Electricity I	C	3	-
GET 203	Engineering Graphics and Solid Modeling II	C	2	-
GET 204	Student Workshop Practice	C	-	2
GET 205	Fundamentals of Fluid Mechanics	C	3	-
GET 206	Fundamentals of Thermodynamics	C	-	3
GET 207	Applied Mechanics	C	3	-
GET 208	Strength of Material	C	-	3
GET 209	Engineering Mathematics I	C	3	-
GET 210	Engineering Mathematics II	C	-	3
GET 211	Computing and Software Engineering	C	3	-
EEE 202	Applied Electricity II	C	-	3
EEE 204	Electrical Engineering Materials	C	-	3
*GET 290	SIWES I	C	-	3
	TOTAL (48 Credits)		24	24

*GET 290 – Student Work Experience Scheme – 9 Weeks

BACHELOR OF ELECTRICAL ELECTRONICS ENGINEERING (B.ENG.)

300 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
ENT 312	Venture Creation	C	-	2
GST 312	Peace and Conflict Resolution	C	-	2
BU – GST 310	Data Analysis using Advanced Excel/SPSS/POWER BI/TABLEAU	C	1	-
BU – GST 312	Family Life	C	-	1
BU – GST 317	Fundamentals of Christian Faith	C	3	-
GET 301	Engineering Mathematics III	C	3	-
GET 302	Engineering Mathematics IV	C	-	3
GET 304	Engineering Communication, Technical Writing and Presentation	C	-	3
GET 305	Engineering Statistics and Data Analytics	C	3	-
GET 306	Renewable Energy System and Technology	C	-	3
GET 307	Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies	C	3	-
TEL 305	Electrical Machines I	C	3	-
EEE 311	Electric Circuit Theory I	C	2	-
EEE 321	Analogue Electronic Circuits I	C	2	-
EEE 322	Digital Electronic Circuits	C	-	2
EEE 324	Electromagnetic Fields and Waves I	C	2	-
EEE 326	Electric Circuit Theory II	C	-	2
BU – EEE 304	Measurement and Instrumentation	C	2	-
*GET 390	SIWES II	C	-	4
	TOTAL (46 Credits)		24	22

*GET 399 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF ELECTRICAL ELECTRONICS ENGINEERING (B.ENG.)

400 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 440	E-Project Management and Simulation	C	1	-
BU – GST 400	Religion and Social Ethics	C	3	-
GET 402	Engineering Project I	C	-	2
*GET 404	Engineering Valuation and Costing	C	-	2
BU-EEE 402	Electromagnetic Fields and Waves II	C	-	2
BU-EEE 403	Electric Power Principles	C	2	-
BU-EEE 404	Electrical Machines II	C	3	-
BU-EEE 405	Control Theory	C	2	-
BU-EEE 406	Principles of Communication Engineering	C	-	3
BU-EEE 407	Power Electronics	C	3	-
BU-GEG 403	Systems Dynamics and Simulation	C	3	-
BU-GEG 404	Numerical Methods	C	-	3
*GET 490	SIWES III	C	-	4
	TOTAL (33) Credits		17	16

*GET 499 – Student Work Experience Scheme – 12 Weeks

*GET 404(*Engineering Valuation and Costing*) – 6 Weeks

BACHELOR OF ELECTRICAL ELECTRONICS ENGINEERING (B.ENG.)

500 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS Core/Elective	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 540	Introduction to Digital Marketing		-	1
BU – GST 500	Seminar on Adventist Heritage	C	3	-
GET 501	Engineering (Project) Management	C	3	-
GET 502	Engineering Law	C	-	2
BU-EEE 501	Embedded Systems Design and Programming	C	2	-
BU-EEE 502	Design of Electrical and ICT Services	C	-	2
BU-EEE 503	Advanced Computer Programming & Use of Simulation Packages	C	2	-
BU-EEE 504	Digital Signal Processing	C	-	2
BU-EEE 505	Reliability Engineering	C	2	-
EEE 590	Final Year Project	C	-	6
POWER AND MACHINES OPTION				
BU-EEE 511	Power System Communication and Control	C	2	-
BU-EEE 512	Electrical Energy Conversion and Storage	C	-	2
BU-EEE 513	Computer Application in Power Systems	C	2	-
BU-EEE 514	Switchgear and High Voltage Engineering	C	-	2
ELECTRONICS AND TELECOMMUNICATIONS OPTION				
BU-EEE 521	Satellite Communications	C	2	-
BU-EEE 522	Broadcasting and Internet Technology	C	-	2
BU-EEE 523	Industrial Electronics Design	C	2	-
BU-EEE 524	Microcomputer Hardware and Software Techniques	C	-	2
COMPUTER AND CONTROL ENGINEERING OPTION				
BU-EEE 531	Digital Computer Networks	C	2	-
BU-EEE 532	Digital Communication Principles	C	-	2
BU-EEE 533	Advanced Electronic Circuits	C	2	-
BU-EEE 534	Modern Control Engineering	C	-	2
	TOTAL (33 Credits)		16	17

Note – the students are to register for two elective in each semester.

B. Eng. ELECTRICAL ELECTRONICS ENGINEERING

COURSE DESCRIPTIONS

GST 001,002 CITIZENSHIP ORIENTATION

0, 0

These are non-credit, but mandatory seminars where students are mentored in all aspects of Christian life. It discusses many topics with the hope of modeling best moral practices on students. Students received either a satisfactory or unsatisfactory grade at the end of the semester.

GST 111 COMMUNICATION IN ENGLISH

(2 Units C: LH 15; PH 45)

Learning Outcomes

1. Identify possible sound patterns in English Language.
2. List notable language skills.
3. Classify word formation processes.
4. Construct simple and fairly complex sentences in English.
5. Apply logical and critical reasoning skills for meaningful presentations.
6. Demonstrate an appreciable level of the art of public speaking and listening.
7. Write simple and technical reports.

Course Contents

Sounds and sound patterns in English Language (vowels and consonants, phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). Major word formation processes; the sentence in English (types: structural and functional). Grammar and usage (tense, concord and modality). Reading and types of reading, comprehension skills, 3RsQ. Logical and critical thinking; reasoning methods (logic and syllogism, inductive and deductive argument, analogy, generalization and explanations). Ethical considerations, copyright rules and infringements. Writing activities (pre-writing (brainstorming and outlining). writing (paragraphing, punctuation and expression). post- writing (editing and proofreading). Types of writing (summary, essays, letter, curriculum vitae, report writing, note-making). Mechanics of writing. Information and Communication Technology in modern language learning. Language skills for effective communication. The art of public speaking.

GST 112 NIGERIAN PEOPLE AND CULTURE

(2 Units C: LH 30)

Learning Outcomes

1. Analyse the historical foundation of Nigerian cultures and arts in pre-colonial times.
2. Identify and list the major linguistic groups in Nigeria.
3. Explain the gradual evolution of Nigeria as a political entity.
4. Analyse the concepts of trade and economic self-reliance of Nigerian peoples in relation to national development.
5. Enumerate the challenges of the Nigerian state regarding nation building.
6. Analyse the role of the judiciary in upholding fundamental human rights.
7. Identify the acceptable norms and values of the major ethnic groups in Nigeria.
8. List possible solutions to identifiable Nigerian environmental, moral and value problems.

Course Contents

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and cultures; peoples and cultures of the minority ethnic groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in

1914; formation of political parties in Nigeria; nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concepts of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigerian peoples; trade, skill acquisition and self-reliance). Social justice and national development (definition and classification of law); Judiciary and fundamental rights. Individuals, norms and values (basic Nigerian norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts [Cultism, kidnapping and other related social vices]). Re-orientation, moral and national values (The 3Rs – Reconstruction, Rehabilitation and Re-orientation; re-orientation strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

BU – GST 105 USE OF LIBRARY AND STUDY SKILLS (2 Units: C: LH 30)

Learning Outcomes

Upon completion of this course, students would have learnt to:

1. Explain the origin of three writing materials from the ancient to information age
2. Explain four types of libraries
3. Explain six importance of libraries in the educational and learning process
4. Explain five importance of Libraries and Information in the Educational and Learning Process
5. Discuss five Sections in the Library and functions performed
6. Explain two Classification Scheme & Library Catalogues
7. Explain four Information Search Tools
8. State four social issues relating to Libraries and rules for users
9. Explain two reference styles

Course Contents

Ancient period to Information age. Evolution of writing Materials. Concept of library. Types of library and information centers. Sections in the library. Parts of book. Electronic Information Resources. Bibliographic entries. Bibliographic control. Library Catalogue. Filing Shelving. Shelve reading. Library automation. Library software applications. Information networking and sharing. How to study. The brain. Memory retention mechanism. Search tools. Information retrieval tools. Reference styles. Social issues relating to Libraries and Information centers. Preparation for academic success.

Minimum Academic Standard

Library

BU – GST 112 HEALTH PRINCIPLES (1 Unit: C: LH 15)

Learning Outcomes

On completion of the course, students should be able to:

1. Define health according to World Health Organisation
2. State five (5) components and the human body and their function
3. Describe at least three (3) determinants of health and well-being
4. List five (5) factors that mental health
5. Explain two (2) current health trends

Course Contents

Meaning of health. Ecology of human disease. Biblical foundation health. Determinants of health. Basic human anatomy and physiology. Body defense mechanism. Element of nutrition. Health implication of nutrition for health. Personal and environment hygiene. Environmental pollution. Substance Abuse. Health implication of substance abuse. Mental health and well- being. Stress coping mechanism. Body pH and Health. Current trends in Health. Sport health and physical activity.

Minimum Academic Standards

Nil

BU – GST 120 ICT FUNDAMENTALS & OFFICE PRODUCTIVITY MANAGEMENT (1 Unit: C: LH 15, PH 45)

Learning Outcome

On completion of the course, students should be able to:

Word:

- i. creating text documents
- ii. editing and formatting the existing documents
- iii. making a text document interactive with different features and tools
- iv. graphical documents, comprising images
- v. used by Authors and Researchers
- vi. detect grammatical errors in a text document.

Excel:

- i. perform data entry and storage
- ii. collection and Verification of business data
- iii. administrative and managerial duties
- iv. accounting and budgeting
- v. data Analysis
- vi. reporting + Visualizations
- vii. forecasting.

PowerPoint:

- i. create presentations from scratch or a template
- ii. add text, images, art, and videos
- iii. select a professional design with PowerPoint Designer.

COURSE CONTENT

Word:

Getting started with word. Adding tables. Controlling page appearance. Formatting text and paragraphs. Inserting graphic objects. Managing lists. Preparing to publish. Working more efficiently. Controlling the follow of a document. Customizing formats using styles and themes. Inserting content using quick parts. Organizing content using tables and charts. Simplifying and managing long documents. Using mail merge. Using templates to automate document formatting.

PowerPoint:

Getting started with PowerPoint. Preparing a PowerPoint presentation. Performing advanced text editing operations. Adding graphical elements to your presentation. Modifying objects in your presentation. Adding tables to your presentation. Adding charts to your presentation. Preparing to deliver your

presentation. Adding SmartArt math equations to a presentation. Collaborating on a presentation. Customizing a slide show. Customizing design templates. Modifying the PowerPoint environment. Securing and distributing a presentation. Working with media and animations.

Excel:

Getting started with excel. Formatting a worksheet. Managing workbooks. Modifying a worksheet. Performing calculations. Printing workbooks.

Lab Work: Students will undertake the following tasks in the practical classes; Learn how to use Microsoft Word to create resumes, reports, and write letters & as a simple text editor.

Learn how to use MS Excel in business analysis, managing lists of people, operations management, and performance reporting & for office administration, project management, and managing programs, contracts and accounts.

Learn how to use PowerPoint to create a slideshow of valuable information through charts, and images for a presentation.

Minimum Academic Standard: Computer studio and simulation Laboratory with NUC-MAS requirement facilities.

BU – GST 126 LIFE AND TEACHINGS OF CHRIST THE MESSIAH (3 Units: C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the historicity of Jesus Christ, using at least five (5) biblical and extant literature;
2. Explore five (5) religio-political and socio-economic events in Palestine during Jesus' time.
3. Enumerate five (5) evidences that Jesus Christ came at the fullness of time;
4. Identify at least three (3) theological implications of the Incarnation;
5. Contrast between Jewish and Jesus' views of the Kingdom;
6. Enumerate any seven (7) teachings of Jesus Christ;
7. Describe any five (5) events leading to Jesus' arrest and crucifixion;
8. Enumerate any five (5) theological implications of Jesus' death and resurrection;

Course Contents

The world which Jesus met and worked in. God with Us. Historicity of Jesus Christ. The fullness of Time. Childhood and Youth of Jesus. The Baptism of Jesus. The temptation of Jesus. The Gospel of the kingdom. The Ministry Jesus Christ. The Mission of Jesus Christ. Jesus' Teaching Methods. The Sermon on the Mount. The last days of Christ earthly life. Gethsemane Experience. Jesus' Arrest. Judgement of Jesus. The Crucifixion. Burial and Resurrection. Jesus' Appearances. Theological implications of Jesus Resurrection and teachings.

Minimum Academic Standards

Standard University Library

CHM 101 GENERAL CHEMISTRY I

(2 Units C: LH 30)

Learning Outcomes

1. Define atom, molecules and chemical reactions.
2. Discuss the modern electronic theory of atoms.
3. Write electronic configurations of elements on the periodic table.

- Rationalise the trends of atomic radii, ionisation energies, electronegativity of the elements, based on their position in the periodic table.
- Identify and balance oxidation–reduction equation and solve redox titration problems.
- Draw shapes of simple molecules and hybridised orbitals.
- Identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship.
- Apply the principles of equilibrium to aqueous systems using Le Chatelier’s principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures.
- Analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy.
- Determine rates of reactions and its dependence on concentration, time and temperature.

Course Contents

Atoms, molecules, elements and compounds, and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence forces; Structure of solids. Chemical equations and stoichiometry; chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

CHM 102 GENERAL CHEMISTRY II

(2 Units C: LH 30)

Learning Outcomes

- State the importance and development of organic chemistry.
- Define fullerenes and its applications.
- Discuss electronic theory.
- Determine the qualitative and quantitative of structures in organic chemistry.
- State rules guiding nomenclature and functional group classes of organic chemistry.
- Determine the rate of reaction to predict mechanisms of reaction.
- Identify classes of organic functional group with brief description of their chemistry.
- Discuss comparative chemistry of group 1A, IIA and IVA elements.
- Describe basic properties of transition metals.

Course Contents

Historical survey of the development and importance of organic chemistry; fullerenes as fourth allotrope of carbon, uses as nanotubules, nanostructures, nanochemistry. Electronic theory in organic chemistry. Isolation and purification of organic compounds; determination of structures of organic compounds including qualitative and quantitative analysis in organic chemistry; nomenclature and functional group classes of organic compounds. Introductory reaction mechanism and kinetics. Stereochemistry. The chemistry of alkanes, alkenes, alkynes, alcohols, ethers, amines, alkyl halides, nitriles, aldehydes, ketones, carboxylic acids and derivatives. The chemistry of selected metals and non -metals. Comparative chemistry of group IA, IIA and IVA elements. Introduction to transition metal chemistry.

CHM 107 GENERAL PRACTICAL CHEMISTRY I

(1 Unit C: PH 45)

Learning Outcomes

- Describe the general laboratory rules and safety procedures.
- Collect scientific data and correctly carrying out Chemical experiments.
- Identify the basic glassware and equipment in the laboratory.

4. Identify the differences between primary and secondary standards.
5. Perform redox titration.
6. Record observations and measurements in the laboratory notebooks.
7. Analyse the data to arrive at scientific conclusions.

Course Contents

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

CHM 108 GENERAL PRACTICAL CHEMISTRY II (1 Unit C: PH 45)

Learning Outcomes

1. Identify the general laboratory rules and safety procedures
2. Collect scientific data and correctly carrying out Chemical experiments.
3. Identify the basic glassware and equipment in the laboratory
4. Identify and carry out preliminary tests which includes ignition, boiling point, melting point, test on known and unknown organic compounds.
5. Perform solubility tests on known and unknown organic compounds.
6. Conduct elemental tests on known and unknown compounds.
7. Conduct functional group/confirmatory test on known and unknown compounds which could be acidic / basic / neutral organic compounds.

Course Contents

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

MTH 101 ELEMENTARY MATHEMATICS I (Algebra and Trigonometry) (2 Units C: LH 30)

Learning Outcomes

At the end of the course students should be able to:

1. Define and explain set, subset, union, intersection, complements, and demonstrate the use of Venn diagrams;
2. Solve quadratic equations;
3. Solve trigonometric functions;
4. Identify various types of numbers; and
5. Solve some problems using binomial theorem.

Course Contents

Elementary set theory, subsets, union, intersection, complements, 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 of any magnitude, addition and factor formulae.

MTH 102 ELEMENTARY MATHEMATICS II (Calculus) (2 Units C: LH 30)

Learning Outcomes

At the end of the course, students should be able to:

1. Identify the types of rules in differentiation and integration;

2. Recognise and understand the meaning of function of a real variable, graphs, limits and continuity;
3. Solve some applications of definite integrals in areas and volumes;
4. Solve function of a real variable, plot relevant graphs, identify limits and idea of continuity;
5. Identify the derivative as limit of rate of change;
6. Identify techniques of differentiation and perform extreme curve sketching;
7. Identify integration as an inverse of differentiation;
8. Identify methods of integration and definite integrals; and
9. Perform integration application to areas, volumes.

Course Contents

Functions of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation, maxima and minima. Extreme curve sketching, integration, definite integrals, reduction formulae, application to areas, volumes (including approximate integration: Trapezium and Simpson's rule).

MTH 103 ELEMENTARY MATHEMATICS III (Vectors, Geometry and Dynamics)

(2 Units C: LH 30)

Learning Outcomes:

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

1. solve some vectors in addition and multiplication.
2. calculate force and momentum.
3. solve differentiation and integration of vectors.
4. analyse kinematics of a particle.

Course Contents

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, scalar multiplication of vectors, linear independence. Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normals. Kinematics of a particle. Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of motion under gravity, projectiles and resisted vertical motion. Elastic string and simple pendulum. Impulse, impact of two smooth spheres and a sphere on a smooth surface.

PHY 101 GENERAL PHYSICS I (Mechanics)

(2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Identify and deduce the physical quantities and their units;
2. Differentiate between vectors and scalars;
3. Describe and evaluate motion of systems on the basis of the fundamental laws of mechanics;
4. Apply Newton's laws to describe and solve simple problems of motion;
5. Evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. Explain and apply the principles of conservation of energy, linear and angular momentum;
7. Describe the laws governing motion under gravity; and
8. Explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

Course Contents

Space and time; units and dimension, vectors and scalars, differentiation of vectors: displacement, velocity and acceleration; kinematics; Newton's laws of motion (inertial frames, impulse, force and action at a distance, momentum conservation); relative motion; application of Newtonian mechanics; equations of motion; conservation principles in Physics, conservative forces, conservation of linear momentum, kinetic energy and work, potential energy, system of particles, centre of mass; rotational motion; torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates; conservation of angular momentum; circular motion; moments of inertia, gyroscopes and precession; gravitation: Newton's law of gravitation, Kepler's laws of planetary motion, gravitational potential energy, escape velocity, satellites motion and orbits.

PHY 102 GENERAL PHYSICS II (ELECTRICITY & MAGNETISM) (2 Units C: LH 30)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the electric field and potential and related concepts, for stationary charges;
2. Calculate electrostatic properties of simple charge distribution using Coulomb's law, Gauss's Law and electric potential;
3. Describe and determine the magnetic field for steady and moving charges;
4. Determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. Describe electromagnetic induction and related concepts and make calculations using Faraday and Lenz's laws;
6. Explain the basic physical of Maxwell's equations in integral form;
7. Evaluate DC circuits to determine the electrical parameters; and
8. Determine the characteristics of AC voltages and currents in resistors, capacitors and Inductors.

Course Contents

Forces in nature, electrostatics, electric charge and its properties, methods of charging, Coulomb's law and superposition, electric field and potential, Gauss's law, capacitance, electric dipoles, energy in electric fields, conductors and insulators, current, voltage and resistance, Ohm's law and analysis of DC circuits, magnetic fields, Lorentz force, Biot-Savart and Ampère's laws, magnetic dipoles, dielectrics, energy in magnetic fields, electromotive force, electromagnetic induction, self and mutual inductances, Faraday and Lenz's laws, step up and step down transformers. Maxwell's equations, electromagnetic oscillations and waves, AC voltages and currents applied to inductors, capacitors, resistance and combinations.

PHY 103 GENERAL PHYSICS III (BEHAVIOUR OF MATTER) (2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Explain the concepts of heat and temperature and relate the temperature scales;
2. Define, derive and apply the fundamental thermodynamic relations to thermal systems;
3. Describe and explain the first and second laws of thermodynamics, and the concept of entropy;
4. State the assumptions of the kinetic theory and apply techniques of describing macroscopic behaviour;
5. Deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium; and
6. Describe and determine the effect of forces and deformation of materials and surfaces.

Course Contents

Heat and temperature, temperature scales; gas laws; general gas equation; thermal conductivity; first Law of thermodynamics; heat, work and internal energy, reversibility; thermodynamic processes; adiabatic, isothermal, isobaric; second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; molecular collisions and mean free path; elasticity; Hooke's law, Young's shear and bulk moduli; hydrostatics; pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 104 GENERAL PHYSIC III (VIBRATION, WAVES AND OPTICS)

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe and quantitatively analyse the behaviour of vibrating systems and wave energy;
2. explain the propagation and properties of waves in sound and light;
3. identify and apply the wave equations; and
4. explain geometrical optics and principles of optical instruments.

Course Contents

Simple harmonic motion (SHM): energy in a vibrating system, Damped SHM, Q values and power response curves, Forced SHM, resonance and transients, Coupled SHM. Normal modes. Waves: types and properties of waves as applied to sound; Transverse and Longitudinal waves; Superposition, interference, diffraction, dispersion, polarization; Waves at interfaces; Energy and power of waves, the 1-D wave equation, 2-D and 3-D wave equations, wave energy and power, phase and group velocities, echo, beats, the Doppler effect, Propagation of sound in gases, solids and liquids and their properties. Optics: Nature and propagation of light; reflection, refraction, and internal reflection, dispersion, scattering of light, reflection and refraction at plane and spherical surfaces, thin lenses and optical instruments, wave nature of light; Huygens's principle, interference and diffraction.

PHY 107 GENERAL PRACTICAL PHYSICS I

(1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs; and
5. Draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements. Experimental techniques. The treatment of measurement errors. Graphical analysis. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc. (covered in PHY 101, 102, 103 and PHY 104). However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis, and deduction.

PHY 108 GENERAL PRACTICAL PHYSICS II

(1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs;
5. Draw conclusions from numerical and graphical analysis of data; and
6. Prepare and present practical reports.

Course Contents

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses that have been covered with emphasis on quantitative measurements, the treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

STA 112 PROBABILITY I

(3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the differences between permutation and combination;
2. explain the concept of random variables and relate it to probability and distribution functions;
3. describe the basic distribution functions; and
4. explain the concept exploratory data analysis.

Course Contents

Permutation and combination. Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distributions: Binomial, geometric, Poisson, normal and sampling distributions; exploratory data analysis.

GET 101 ENGINEER IN SOCIETY

(1 Unit C: LH 15)

Learning Outcomes

1. Understand the characteristics of 'engineering' and the role engineers have played in shaping engineering up to the present and into the future.
2. Apply principles of mathematics, science, and engineering in a variety of contexts.
3. Use the techniques, skills, and tools necessary for science and engineering practice.
4. Design and conduct experiments, as well as to analyze and interpret data.
5. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
6. Appraise the role of a professional engineer, Code of Conduct and Ethics.
7. Demonstrate teamwork skills for working in group projects.
8. Identify, formulate, and solve engineering problems.

Course Contents

History, evolution and philosophy of science. Engineering and technology. The engineering profession – engineering family (engineers, technologists, technicians and craftsmen), professional bodies and

societies. Engineers' code of conduct and ethics, and engineering literacy. Sustainable development goals (SDGs), innovation, infrastructures and nation building - economy, politics, business. Safety and risk analysis in engineering practice. Engineering competency skills – curriculum overview, technical, soft and digital skills. Guest seminars and invited lectures from different engineering professional associations.

GET 102 ENGINEERING GRAPHICS AND MODELLING I

(2 Units C: LH 15; PH 45)

Learning Outcomes

1. Have a good grasp of design thinking and be obsessed with the determination to apply such to solving simple everyday and also complex problems.
2. Recognise the fundamental concepts of engineering drawing and graphics.
3. How skills to represent the world of engineering objects in actionable solid models, and put such models in a form where they can be inputs for simulation and analyses;
4. Analyse such models for strength and cost;
5. Prepare the objects for modern production and manufacturing techniques of additive and subtractive manufacturing;
6. Recognise that engineering is multidisciplinary in the sense that mechanical, electrical and other parts of physical structures are modelled in context as opposed to the analytical nature of the courses they take; and
7. Analyse and master the basics of mechanical and thermal loads in engineering systems.

Course Contents

Introduction to design thinking and engineering graphics. First and third angle orthogonal projections. Isometric projections; sectioning, conventional practices, conic sections and development. Freehand and guided sketching – pictorial and orthographic. Visualization and solid modelling in design, prototyping and product-making. User interfaces in concrete terms. Design, drawing, animation, rendering and simulation workspaces. Sketching of 3D objects. Viewports and sectioning to shop drawings in orthographic projections and perspectives. Automated viewports. Sheet metal and surface modelling. Material selection and rendering. This course will use latest professional design tools such as fusion 360, solid works, solid edge or equivalent.

EEE 102 INTRODUCTION TO ELECTRICAL ELECTRONICS ENGINEERING

(2 Units C: LH 30)

Learning Outcomes

Students will be able to:

1. Comprehend the duties and functions of an Electrical and Electronic Engineer (EEE);
2. State the requirements for the profession and career opportunities;
3. State the careers related to EEE; and
4. Explain the future of EEE.

Course Contents

History of Electrical Engineering. Evolution of EEE. Duties of EE Engineers. Areas of specialization and work environment. Skill requirements (soft and hard). Qualities for EE Engineers. Careers related to EEE. Typical course modules. Job outlook/opportunities for EE Engineers. Future of EEE. Professional registration (NSE, COREN, IIEEE, IET, etc.). Passive components (R, L, C, transformers): descriptive features, including values and colour codes, uses in electrical circuits. DC and AC signal parameters

ENT 211 ENTREPRENEURSHIP AND INNOVATION

(2 units C: LH 30)

Learning Outcomes

1. Explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation and risk-taking;
2. State the characteristics of an entrepreneur;
3. Analyse the importance of micro and small businesses in wealth creation, employment generation and financial independence;
4. Engage in entrepreneurial thinking;
5. Identify key elements in innovation;
6. Describe the stages in enterprise formation, partnership and networking, including business planning;
7. Describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world; and
8. State the basic principles of e-commerce.

Course Contents

The concept of entrepreneurship (entrepreneurship, intrapreneurship/corporate entrepreneurship); theories, rationale and relevance of entrepreneurship (Schumpeterian and other perspectives, risk-taking, necessity and opportunity-based entrepreneurship, and creative destruction). Characteristics of entrepreneurs (opportunity seeker, risk-taker, natural and nurtured, problem solver and change agent, innovator and creative thinker). Entrepreneurial thinking (critical thinking, reflective thinking and creative thinking). Innovation (The concept of innovation, dimensions of innovation, change and innovation, knowledge and innovation). Enterprise formation, partnership and networking (basics of business plan, forms of business ownership, business registration and alliance formation, and joint ventures). Contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office and networking). Entrepreneurship in Nigeria (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

GST 212 PHILOSOPHY, LOGIC AND HUMAN EXISTENCE (2 units C: LH 30)

Learning Outcomes

1. Know the basic features of philosophy as an academic discipline.
2. Identify the main branches of philosophy & the centrality of logic in philosophical discourse.
3. Know the elementary rules of reasoning.
4. Distinguish between valid and invalid arguments.
5. Think critically and assess arguments in texts, conversations and day-to-day discussions.
6. Critically assess the rationality or otherwise of human conduct under different existential conditions.
7. Develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge.
8. Guide his or her actions, using the knowledge and expertise acquired in philosophy and logic.

Course Contents

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character molding.

BU – GST 200 COMMUNICATION IN FRENCH

(1 Units: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Abilities to greet
2. Knowing how to express time.
3. Knowledge of counting up 1000
4. Conjugaison of Etre and Avoir and be able to form sentences with the auxiliaries
5. Use pronoun instead of names
6. Make sentences in present tense with the verbs
7. Presentation of oneself in French Language.
8. Essay witing.

Course Contents

Alphabet. Salutation. L'heure. Le nombre. Le pronom personnel et l'auxiliaire Avoir et Être Les trois groupe verbes au présent de l'indicatif () premier groupe verbe, Deuxième groupe verbe, Troisième groupe verbe) Adjective possessive, Adjective Démonstratif etc et présentation

BU – GST 215 ADVENTIST HERITAGE

(3 Units: C: LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Explain the history of the Seventh-day Adventist Church.
2. Illustrate the systematic development of the Seventh-day Adventist Church.
3. State the contributions of at least five (5) pioneers of the Seventh-day Adventist Church.
4. Explain the seven (7) pillars of the Seventh-day Adventist church doctrine.
5. Describe the Seventh-day Adventists' concepts of holistic education, health reforms, and publishing ministries.
6. Identify at least eight (8) major contributions of Adventist education, health reforms, and publishing ministries.
7. Enumerate at least (7) areas in which the prophetic gift has shaped the mission of the Seventh-day Adventist Church.
8. Explain the meaning of Adventism and the aim of Adventist mission.
9. Describe the dynamics involved in the origin and growth of Seventh-day Adventism in Africa.
10. List at least eight (8) major contributions of the Seventh-day Adventism in Africa, with specific focus on national growth and development.

Course Contents

The historical and prophetic origin of the Seventh-day Adventist Church. Millerite roots, before 1844. The 1844 experiences. The development and organization of the Seventh-day Adventist Church. The era of doctrinal and organizational development (1844 – 1863). The era of institutional and lifestyle development (1863ff). The era of revival, reform, and expansion (1888 – 1900). The era of reorganization and Crisis (1901 - 1910). The era of worldwide growth (1910 – 1955). The challenges and possibilities of maturity (1955). The contributions of the pioneers and founders of the Seventh-day Adventist Church. The Pillars of Adventism. Adventists' concepts of holistic education. Healthcare and reforms. Publishing ministries. The prophetic gift in the Seventh-day Adventist Church. Significance of prophetic gift to the Adventist Mission. The purpose of Adventism. Adventist concept of mission. The origin, exploits and challenges of Seventh-day Adventism in Africa. Contributions of the Seventh-day Adventism in Africa.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts.

BU – GST 220 ORIGIN OF SCIENCE

(1 Unit: C: LH 15)

Learning Outcomes:

On completion of the course, the students should be able to:

1. Outline the major steps of the scientific method and its limitations.
2. Describe three (3) scientific theories on the origin of life and their major challenges.
3. State two (2) characteristics of a molecular structure that posed challenges to evolution.
4. Identify one (1) strength and drawback of the geologic column and fossil record to the evolutionary concept.
5. State two (2) evidences in nature and archeology that support Biblical creation account.
6. List three (3) faith-believing and non-faith scientists and their major contributions to science.
7. List two (2) alternative theories to evolution and their evidence.
8. Discuss the harmony between science and religion.

Course Contents

Religion and Science. Origin, Creation and the Flood. Scientific theories about the Origin of Life. Darwinism and theory of Evolution. Micro- and Macro-evolution. Geologic column, Fossil record. Aspects of Human origin. Drawback to the theory of evolution and Darwinism. Cambrian explosion. Incompleteness of the Fossil record. Origin of the Universe and the Total Environment. The Big bang theory. Scientific dating and drawback. Alternative theories of Origin. Intelligent Design (ID). Molecular machines and Irreducible Complexity (IC). Specificity and regulation of the DNA. Fine tuning of the Universe. Uniqueness of the Planet Earth and Life. The Flood. The Scientific method and Limitations of Science. Science, Reasoning and Faith.

Minimum Academic Standards

None.

BU – GST 221 INTRODUCTION TO AGRICULTURE

(1 Unit: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Recall the definition and discuss at least three (3) of the branches of agriculture.
2. Critique five important agricultural policies in Nigeria.
3. Discuss the objectives of Soil Science.
4. Discuss 5 physical properties of soil.
5. Discuss the characteristics of different soil types.
6. Discuss the reasons for losses of agricultural soil
7. Discuss different types of agricultural systems and practices with relevant examples in Nigeria
8. Describe the different types of crops with examples from across Nigeria
9. Discuss the problems facing livestock producers across Nigeria
10. Describe 3 common management practices in poultry/livestock production.

Course Contents

Introduction to Agriculture, its origin, branches and importance; Definition, scope and objectives & review of Agricultural policies; Introduction to soil science, its aims and objectives; Soil formation and

soil physical properties; Erosion; Introduction to Crop Science (Agricultural systems/practices); Livestock production (importance & problems of livestock industry); Production practices of some selected ruminants, monogastric & non-ruminant herbivores; Non-conventional livestock production practices

Minimum Academic Standards

Field experimental plots

BU – GST 290 INTRODUCTION TO DATA ANALYTICS (1 Unit: C: LH 15; PH 45)

Learning Outcome

On completion of the course. Students should be able to do:

1. uncertainty analysis
2. data fitting
3. feed-forward neural networks
4. probability density functions
5. correlation functions
6. fourier analysis and FFT procedures
7. spectral analysis
8. digital filtering
9. hilbert transforms.

Course Content

Connecting to data. Simplifying and sorting data. Organizing data. Posing a question. Wrangling data into a format. fixing data problems. exploring the data. finding patterns. building intuition. comparing measures. Statistics and forecasting. Dashboards and stories.

Lab Work: Students will undertake the following tasks in the practical classes; learn how to analyze data to understand data through natural language queries that allows to ask questions about data without having to write complicated formulas. In addition, students will learn how to analyze data to provide high-level visual summaries, trends, and patterns.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement.

GET 201 APPLIED ELECTRICITY (3 Units C: LH 45)

Learning Outcomes

1. Discuss the fundamental concepts of electricity and electrical d.c. circuits;
2. State, explain and apply the basic d.c. circuit theorems;
3. Explain the basic a.c. circuit theory and
4. Apply to solution of simple circuits.

Course contents

Fundamental concepts: Electric fields, charges, magnetic fields. Current, B-H curves Kirchhoff's laws, superposition. Thevenin, Norton theorems, Reciprocity, RL, RC, RLC circuits. DC, AC bridges, Resistance, Capacitance, Inductance measurement, Transducers, Single phase circuits, Complex j - notation, AC circuits, impedance, admittance, and susceptance.

GET 202 ENGINEERING MATERIALS (3 Units C: LH 45)

Learning Outcomes

On the completion of the course, the student should be able to –

1. Examine at least five (5) basic properties of various engineering materials
2. Assess basic structure of at least five (5) engineering materials.
3. Analyze the relationship between the structures of engineering materials.
4. Explain five (5) applications of metals and alloys in electrical and electronics engineering industry.
5. Examine five (5) applications of composites in the electronics engineering industry.
6. Explain the difference between electronic structures and five (5) physical properties of semiconductors, metals, and dielectrics.
7. Examine five (5) basic optical parameters of semiconductors materials.

Course Contents

Basic structure of ceramics and alloys. composites, Basic structure of metals and polymers. Relationships between the structure of materials. Mechanical and electrical properties of engineering materials. Magnetic and thermal properties of engineering materials. Chemical properties of engineering materials. Introduction to electronic configuration. Atomic structures and inter-atomic bonding mechanisms. Crystal and microstructure. Chemistry and relationships between structure and properties related engineering materials (Alloys. Ceramics. Alloys. Polymers. Plastics). Composites and its application. Nanomaterials. Integrity of engineering materials. Engineering materials processing. Destructive and non-destructive testing of engineering materials. Principles of the behaviour of materials in common environments. Fabrication processes and applications. Study of engineering materials with emphasis on selection and application of materials in industry. A discipline specific design project is required.

GET 203 ENGINEERING GRAPHICS AND MODELLING II (3 Units C: LH 30; PH 45)

Learning Outcomes

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

1. Apply mastery of the use of projections to prepare detailed working drawing of objects and designs;
2. Identify skills in parametric design to aid their ability to see design in the optimal specification of materials and systems to meet needs;
3. Be able to analyze and optimize designs on the basis of strength and material minimization;
4. Get their appetites wetted in seeing the need for the theoretical perspectives that create the basis for the analysis that are possible in design and optimization, and recognize/understand the practical link to excite their creativity and ability to innovate; and
5. Be able to translate their thoughts and excitements to produce shop drawings for multiphysical, multidisciplinary design.

Course contents

Projection of lines, auxiliary views and mixed projection. Preparation of detailed working production drawing; semi-detailed drawings, conventional presentation methods. Solid, surface and shell modeling. Faces, bodies and surface intersections. Component-based design. Component assembly and motion constraints. Constrained motions and animation. Introduction to electronics modeling. Electronics board layout preparation, Component libraries and Schematic design. Parametric modeling and adaptive design. Simulation for material optimization. Designing for manufacturing. Additive and subtractive

manufacturing. Production for 3-D printing, Laser cutting and CNC machinery. Arrangement of engineering components to form a working plant (Assembly Drawing of a Plant).

GET 204 STUDENT WORKSHOP PRACTICE (2 Units C: LH 15; PH 45)

Learning Outcomes

1. Identify various basic hands and machine tools, analogue and digital measurement devices and instruments, and acquire skills in their effective use and maintenance.
2. Practically apply basic engineering technologies, including metrology, casting, metal forming and joining, materials removal, machine tooling (classification, cutting tool action, cutting forces, non-cutting production) and CNC machining technology.
3. Master workshop and industrial safety practices, accident prevention and ergonomics.
4. Physically recognise different electrical & electronic components like resistances, inductances, capacitances, diodes, transistors and their ratings.
5. Connect electric circuits, understand different wiring schemes, and check ratings of common household electrical appliances and their basic maintenance.
6. Determine household and industrial energy consumption, and understand practical energy conservation measures.

Course Contents

The course comprises general, mechanical and electrical components: supervised hands-on experience in safe usage of tools and machines for selected tasks; Use of measuring instruments (calipers, micrometers, gauges, sine bar, wood planners, saws, sanders, and pattern making). Machine shop: lathe work shaping, milling, grinding, reaming, metal spinning. Hand tools, gas and arc welding, cutting, brazing and soldering. Foundry practice. Industrial safety and accident prevention, ergonomics, metrology. Casting processes. Metal forming processes: hot-working and cold-working processes (forging, press-tool work, spinning, etc.). Metal joining processes (welding, brazing and soldering). Heat treatment. Material removal processes. Machine tools and classification. Simple theory of metal cutting. Tool action and cutting forces. Introduction to CNC machines.

Supervised identification, use and care of various electrical and electronic components such as resistors, inductors, capacitors, diodes and transistors. Exposure to different electric circuits, wiring schemes, analogue and digital electrical and electronic measurements. Household and industrial energy consumption measurements. Practical energy conservation principles.

GET 205 FUNDAMENTALS OF FLUID MECHANICS (3 Units C: LH 45)

Learning Outcomes

1. Explain the properties of fluids.
2. Determine forces in static fluids and fluids in motion.
3. Determine whether a floating body will be stable.
4. Determine the effect of various instruments, (valves, orifices, bends and elbows) on fluid flow in pipes.
5. Measure flow parameters with venturi meters, orifice meters, weirs, etc.
6. Perform calculations based on principles of mass, momentum and energy conservation.
7. Perform dimensional analysis and simple fluid modelling problems.
8. Specify the type and capacity of pumps and turbines for engineering applications.

Course Contents

Fluid properties, hydrostatics, fluid dynamics using principles of mass, momentum and energy conservation from a control volume approach. Flow measurements in pipes, dimensional analysis, and similitude, 2-dimensional flows. Hydropower systems.

GET 206 FUNDAMENTALS OF ENGINEERING THERMODYNAMICS (3 Units C: LH 45)

Learning Outcomes

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

1. Describe basic concepts of thermodynamics, quantitative relations of Zeroth, first, second and third laws;
2. Define and explain system, surrounding, closed and open system, control volume and control mass, extensive and intensive properties;
3. Calculate absolute and gage pressure, and absolute temperature, calculate changes in kinetic, potential, enthalpy and internal energy;
4. Evaluate the properties of pure substances i.e. Evaluate the state of the pure substances such as compressed liquid, saturated liquid-vapour mixture and superheated vapour using property diagrams and tables; arrange the ideal and real gas equations of state,
5. Formulate the first law of thermodynamics for a closed system i.e. Organize the change in energy in the closed systems via heat and work transfer;
6. Distinguish heat transfer by conduction, convection and radiation, and calculate the amount of heat energy transferred;
7. Calculate the changes in moving boundary work, spring work, electrical work and shaft work in closed systems;
8. Apply the first law of thermodynamics for closed systems and construct conservation of mass and energy equations;
9. Formulate the first law of thermodynamics to the open systems i.e. Describe steady-flow open system, apply the first law of thermodynamics to the nozzles, diffusers, turbines, compressors, throttling valves, mixing chambers, heat exchangers, pipe and duct flow;
10. Construct energy and mass balance for unsteady-flow processes;
11. Evaluate thermodynamic applications using second law of thermodynamics;
12. Calculate thermal efficiency and coefficient of performance for heat engine, refrigerators and heat pumps; and
13. Restate perpetual-motion machines, reversible and irreversible processes.

Course Contents

Basic concepts, definitions and laws (quantitative relations of Zeroth, first, second and third laws of thermodynamics). Properties of pure substances: the two-property rule (P-v-T behaviour of pure substances and perfect gases); state diagrams. The principle of corresponding state; compressibility relations; reduced pressure; reduced volume; temperature; pseudo-critical constants. The ideal gas: specific heat, polytropic processes. Ideal gas cycles; Carnot; thermodynamic cycles, turbines, steam and gas, refrigeration. The first law of thermodynamics – heat and work, applications to open and closed systems. The steady flow energy equation (Bernoulli's equation) and application. Second law of thermodynamics, heat cycles and efficiencies.

GET 207 APPLIED MECHANICS

(3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the fundamental principles of applied mechanics, particularly equilibrium analysis, friction, kinematics and momentum;
2. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, mathematics and applied mechanics;

3. synthesize Newtonian Physics with static analysis to determine the complete load impact (net forces, shears, torques, and bending moments) on all components (members and joints) of a given structure with a load; and
4. apply engineering design principles to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Course Contents

Statics. Fundamentals of mechanics. Forces in a plane. Forces in space. Equivalent systems of forces. Equilibrium of rigid bodies in two and three dimensions. Equivalent systems of forces. Distributed forces. Centroid. Center of mass. Analysis of simple structures and machine parts. Frictional forces. Moments of inertia. Principle of virtual work.

Dynamics. Kinematics of a particle. Rectilinear motion of particles. Curvilinear motion of particles. Kinetics of particles. Force. Mass and acceleration. Kinetics of particles. Work and energy. Impulse and momentum. Kinematics of rigid bodies. Forces and acceleration.

GET 208 STRENGTH OF MATERIALS

(3 Units C: LH 45)

Learning Outcomes

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

1. Evaluate stresses and strains in five (5) points in homogenous materials.
2. Evaluate stresses and strains in five (5) points in isotropic materials.
3. Generate in six (6) examples the stresses and strains in axially-loaded members.
4. Create in six (6) examples the stresses and strains in circular torsion members.
5. Analyze in five (5) examples the stresses and strains in members subject to flexural loadings.
6. Determine in five (5) examples the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels
7. Apply the concept of Mohr's circle to evaluate five (5) examples of stresses and strain.

Course Contents

Consideration of equilibrium in composite members. Stress-strain relation. Axial load and statically indeterminate axially loaded members. Generalized Hooke's law. Stresses and strains due to loading and temperature changes. Thermal stress. Torsion of circular members. Angle of twist. Statically indeterminate torque-loaded members. Shear force and bending moments. Bending stresses in beams with symmetrical loading. Bending stresses in beams with combined loadings. Transverse shear. Eccentric axial loading of beams. Stress and strain transformation equations. Mohr's circle. Elastic buckling of columns.

GET 209 ENGINEERING MATHEMATICS I

(3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Solve qualitative problems based on vector and matrix analyses such as linear independence and dependence of vectors, rank etc;
2. Describe the concepts of limit theory and nth order differential equations and their applications to physical phenomena;
3. Solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables;

4. Describe the applications of double and triple integration in finding the area and volume of engineering solids, and explain the qualitative applications of Gauss, Stoke's and Green's theorem;
5. Explain ordinary differential equations and applications, and develop a mathematical model of linear differential equations, as well as appreciate the necessary and sufficient conditions for total differential equations; and
6. Analyse basic engineering models through partial differential equations such as wave equation, heat conduction equation, etc., as well as fourier series, initial conditions and its applications to different engineering processes

Course Contents

Limits, continuity, differentiation, introduction to linear first order differential equations, partial and total derivatives, composite functions, matrices and determinants, vector algebra, vector calculus, directional derivatives.

GET 210 ENGINEERING MATHEMATICS II

(3 Units C: LH 45)

Learning Outcomes

1. Describe physical systems using ordinary differential equations (ODEs).
2. Explain the practical importance of solving ODEs, solution methods, and analytically solve a wide range of ODEs, including linear constant coefficient types.
3. Numerically solve differential equations using MATLAB and other emerging applications.
4. Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion, as well as on functions of several variables, including directional derivatives and multiple integrals.
5. Solve problems using the fundamental theorem of line integrals, Green's theorem, the divergence theorem, and Stokes' theorem, and perform operations with complex numbers.
6. Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions of complex variables, as well as the theory of conformal mapping to solve problems from various fields of engineering.
7. Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula.

Course Contents

Introduction to ordinary differential equations (ODEs); theory, applications, methods of solution; second order differential equations. Advanced topics in calculus (vectors and vector-valued function, line integral, multiple integral and their applications). Elementary complex analysis including functions of complex variables, limits and continuity. Derivatives, differentiation rules and differentiation of integrals. Cauchy-Riemann equation, harmonic functions, basic theory of conformal mapping, transformation and mapping and its applications to engineering problems. Special functions.

GET 211 COMPUTING AND SOFTWARE ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems.
2. Develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical

object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from Python, Java or C++.

3. Use widely available libraries to prepare them for machine learning, graphics and design simulations.
4. Develop skills in eliciting user needs and designing an effective software solution.
5. Recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services.
6. Acquire capabilities that can further be developed to make them productively employable by means of short Internet courses in specific areas.

Course Contents

Introduction to computers and computing; computer organization – data processing, memory, registers and addressing schemes; Boolean algebra; floating-point arithmetic; representation of non-numeric information; problem-solving and algorithm development; coding (solution design using flowcharts and pseudo codes). Data models and data structures; computer software and operating system; computer operators and operators precedence; components of computer programs; introduction to object oriented, structured and visual programming; use of MATLAB in engineering applications. ICT fundamentals, Internet of Things (IoT). Elements of software engineering.

EEE 202 APPLIED ELECTRICITY II

(3 Units C: LH 30; PH 45)

Learning outcomes

On completion of the course. Students should be able to:

1. Differentiate between various d.c. and a.c. machines;
2. Explain the principles of operation of machines;
3. Explain the operation of basic semiconductor devices and their basic applications; and
4. Explain the principle of operation of communication systems with examples.

Course contents

Free electron motion in static electric and magnetic fields, electronic structure of matter, conductivity in crystalline solids. Theory of energy bands in conductors, insulators and semiconductors: electrons in metals and electron emissions; carriers and transport phenomena in semiconductors, characteristics of some electron and resistors, diodes, transistors, photo cell and light emitting diode. Elementary discrete devices fabrication techniques and IC technology.

EEE 204 ELECTRICAL ENGINEERING MATERIALS

(3 Units C: LH 45)

Learning outcomes

On completion of the course. Students should be able to:

1. Differentiate between various d.c. And a.c. Machines;
2. Explain the principles of operation of machines;
3. Explain the operation of basic semiconductor devices and their basic applications; and
4. Explain the principle of operation of communication systems with examples.

Course contents

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

GET 290 STUDENT INDUSTRIAL WORK EXPERIENCE I

(3 Units C: 9 weeks)

Learning Outcomes

On completion of the course. Students should be able to:

1. Acquire industrial workplace perceptions, ethics, health and safety consciousness, inter-personal skills and technical capabilities needed to give them a sound engineering foundation.
2. Learn and practice basic engineering techniques and processes applicable to their specializations.
3. Build machines, devices, structures or facilities relevant to their specific engineering programmes and applications.
4. Acquire competence in technical documentation (log-book) and presentation (report) of their practical experiences.

Course Contents

Practical experience in a workshop or industrial production facility, construction site or special centers in the university environment, considered suitable for relevant practical/industrial working experience but not necessarily limited to the student's major. The students are exposed to hands-on activities on workshop safety and ethics, maintenance of tools, equipment and machines, welding, fabrication and foundry equipment, production of simple devices; electrical circuits, wiring and installation. (8-10 weeks during the long vacation following 200 level).

ENT 312 VENTURE CREATION

(2 Units C: LH 15; PH 45)

Learning Outcomes

1. Analyze the concepts of peace, conflict and security.
2. List major forms, types and root causes of conflict and violence.
3. Differentiate between conflict and terrorism;
4. Enumerate security and peace building strategies.
5. Describe the roles of international organisations, media and traditional institutions in peace building.

Course Contents

Opportunity identification (sources of business opportunities in Nigeria, environmental scanning, demand and supply gap/unmet needs/market gaps/market research, unutilized resources, social and climate conditions and technology adoption gap). New business development (business planning, market research). Entrepreneurial finance (venture capital, equity finance, micro-finance, personal savings, small business investment organizations and business plan competition). Entrepreneurial marketing and e-commerce (principles of marketing, customer acquisition & retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E-commerce business models and successful e-commerce companies). Small business management/family business: Leadership & Management, basic book keeping, nature of family business and family business growth model. Negotiation and business communication (strategy and tactics of negotiation/bargaining, traditional and modern business communication methods). Opportunity discovery demonstrations (business idea generation presentations, business idea contest, brainstorming sessions, idea pitching). Technological solutions (The concept of market/customer solution, customer solution and emerging technologies, business applications of new technologies - artificial intelligence (AI), virtual/mixed reality (VR), Internet of things (IoTs), blockchain, cloud computing, renewable energy, etc. Digital business and e-commerce strategies).

GST 312 PEACE AND CONFLICT RESOLUTION

(2 Units C: LH 30)

Learning Outcomes

1. Describe the key steps in venture creation;
2. Spot opportunities in problems and in high potential sectors, regardless of geographical location.
3. State how original products, ideas and concepts are developed.

4. Develop a business concept for further incubation or pitching for funding.w
5. Identify key sources of entrepreneurial finance.
6. Implement the requirements for establishing and managing micro and small enterprises.
7. Conduct entrepreneurial marketing and e-commerce.
8. Apply a wide variety of emerging technological solutions to entrepreneurship.
9. Appreciate why ventures fail due to lack of planning and poor implementation.

Course Contents

The concepts of peace, conflict and security in a multi-ethnic nation. Types and theories of conflicts: ethnic, religious, economic, geo-political Conflicts; structural conflict theory, realist theory of conflict, frustration-aggression conflict theory; root causes of conflict and violence in Africa: indigene and settlers phenomenon, boundaries/boarder disputes, political disputes, ethnic disputes and rivalries, economic inequalities, social disputes, nationalist movements and agitations; selected conflict case studies – Tiv-Junkun, ZangoKartaf, chieftaincy and land disputes, etc. Peace building, management of conflicts and security: Peace & Human Development. Approaches to Peace & Conflict Management (religious, government, community leaders, etc.). Elements of peace studies and conflict resolution: Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and terrorism. Peace mediation and peace keeping. Peace and Security Council (international, national and local levels). Agents of conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution (ADR) (dialogue, arbitration, negotiation, collaboration, etc). The roles of international organizations in conflict resolution ((a) The United Nations, UN and its conflict resolution organs. (b) The African Union & Peace Security Council (c) ECOWAS in peace keeping). The media and traditional institutions in peace building. Managing post-conflict situations/crises: Refugees. Internally Displaced Persons (IDPs); the role of NGOs in post-conflict situations/crises.

BU – GST 310 DATA ANALYSIS USING ADVANCED EXCEL / SPSS / POWER BI / TABLEAU (1 Units C: LH 45, PH 45)

Learning Outcome

At the end of the course. the students should be able to:

- i. use pivot tables and pivot charts
- ii. use conditional formatting
- iii. remove duplicates
- iv. use XLOOKUP
- v. prepare datasets for use in Power BI Desktop or Power BI Service
- vi. ii. learn to manage big data prep using systems like Power Query
- vii. iii. create visualizations within a Power BI Dashboard
- viii. read-in, enter, organize, and save data in a suitable way.
- ix. calculate/recode variables and prepare data for analysis.
- x. conduct descriptive and basic inferential statistics.
- xi. be familiar with SPSS presentation of statistical output.
- xii. create and edit graphical displays of data.

Course Content

Connecting to data. Simplifying and sorting data. Organizing data. Slicing data by date. Using multiple measures in a view. Showing the relationship between numerical values. Mapping data geographically.

rearing, Family planning methods,- Biblical perspectives on parenting and child rearing, The four parenting styles, Conflict and conflict resolution, Causes of marital conflict, Basic steps on conflict resolution, Divorce in marriage, Causes, effect, control, Domestic Violence.

BU – GST 317 FUNDAMENTALS OF CHRISTIAN FAITH (3 Units C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the history and development of the Old Testament and the New Testament Scripture;
2. Enumerate at least five (5) attributes of God;
3. Identify any seven (7) characteristic features of the Holy Spirit;
4. Assess any five (5) interconnectedness between the Law and grace;
5. Enumerate at least five (5) evidences of the biblical Sabbath;
6. Identify the symbolism and interpretation of the Daniel 2.
7. Assess at least four (4) signs of Christ's Second Coming;
8. Explain at least three (3) of the biblical ordinances in the scriptures
9. Describe any three (3) of the Christian lifestyles

Course Contents

Nature of Inspiration. God's Word. Authenticity of the Bible. Theology of God: His Names & Attributes. The Holy Spirit. Creation. Origin of Sin. Fall of Man. The Flood. Jesus' Incarnation and Ministry of Intercession. Law and Grace. The Sabbath. The Church and its Mission. Prophecy of Daniel 2. Second Coming. The Signs of the Second Coming. Manner of Jesus' Second Coming. Millennium and the New Earth. Biblical Ordinances. Christian Lifestyles. Prophetic Gift and the Church.

Minimum Academic Standards

Standard Modern library.

GET 301 ENGINEERING MATHEMATICS III (3 Units C: LH 45)

Learning Outcomes

1. Demonstrate a clear understanding of the course content, that is, possess a breadth of knowledge in the area covered.
2. Possess an in-depth knowledge upon which a solid foundation can be built in order to demonstrate a depth of understanding in advanced mathematical topics.
3. Develop simple algorithms and use computational proficiency.
4. Write simple proofs for theorems and their applications.
5. Communicate the acquired mathematical knowledge effectively in speech, writing and collaborative groups.

Course Contents

Linear Algebra. Elements of Matrices, Determinants, Inverses of Matrices. Theory of Linear Equations. Eigen Values and Eigen Vectors. Analytical Geometry. Coordinate Transformation.

Solid Geometry. Polar, cylindrical and spherical coordinates. Elements of functions of several variables. Surface Variables. Ordinary Integrals. Evaluation of Double Integrals, Triple Integrals, Line Integrals and Surface Integrals. Derivation and Integrals of Vectors. The gradient of scalar quantities. Flux of Vectors. The curl of a vector field, Gauss, Greens and Stoke's theorems and applications. Singular Valued

Functions. Multivalued Functions. Analytical Functions. Cauchy Riemann's Equations. Singularities and Zeroes. Contour Integration including the use of Cauchy's Integral Theorems. Bilinear transformation.

GET 302 ENGINEERING MATHEMATICS IV

(3 Units C: LH 45)

Learning Outcomes

1. Solve second order differential equations.
2. Solve partial differential equations.
3. Solve linear integral equations.
4. Relate integral transforms to solution of differential and integral equations;
5. Explain and apply interpolation formulas.
6. Apply Runge-Kutta and other similar methods in solving ODE and PDEs.

Course Contents

Series solution of second order linear differential equations with variable coefficients. Bessel and Legendre equations. Equations with variable coefficients. Sturm-Liouville boundary value problems. Solutions of equations in two and three dimensions by separation of variables. Eigen value problems. Use of operations in the solution of partial differential equations and Linear integral equations. Integral transforms and their inverse including Fourier, Laplace, Mellin and Heaviside Transforms. Convolution integrals and Hilbert Transforms. Calculus of finite differences. Interpolation formulae. Finite difference equations. Runge-Kutta and other methods in the solutions of ODE and PDEs. Numerical integration and differentiation.

GET 304 ENGINEERING COMMUNICATION, TECHNICAL WRITING AND PRESENTATION

(3 Units C: LH 45)

Learning Outcomes

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

Course Contents

A brief review of common pitfalls in writing. Principles of clear writing (punctuations and capitalization). Figures of speech. Units of grammar. Tenses and verb agreement. Active and passive sentences Lexis and structure Fog Index concept. Skills for communication and communication algorithm. Types and goals of communication; Interpersonal communication; features and the Finger Model or A,B,C,D,E of good interpersonal communication (accuracy of technical terms, brevity of expression, clarity of purpose, directness of focus and effectiveness of the report). Language and organization of reports. Technical report writing skills(steps, problems in writing, distinguishing technical and other reports, significance, format and styles of writing technical reports). Different formats for communication; styles of correspondences – business report and proposal, business letter, memorandum, e-mails, etc. Proposals for projects and research; format, major steps and tips of grant-oriented proposals. Research reports (competency, major steps, components and formats of research reports and publishable communication). Sources and handling of data, tables, figures, equations and references in a report. Presentation skills; overview, tips,

organization, use of visual aids and practising of presentation. Intellectual property rights in research reports. Case studies of major engineering designs, proposals and industrial failures with professional presentation of reports.

GET 305 ENGINEERING STATISTICS AND DATA ANALYTICS (3 Units C: LH 45)

Learning Outcomes

1. Work with data from the point of view of knowledge convergence, machine learning, and intelligence augmentation, which significantly raises their standard for engineering analysis (the approach forces them to learn statistics in an actionable way that helps them to see the holistic importance of data analytics in modern engineering and technology).
2. Anticipate the future with Artificial Intelligence while fulfilling the basic requirements of conventional engineering statistical programming consistent with their future careers;
3. Perform, with proficiency, statistical inference tasks with language or programming toolboxes such as R, Python, Mathematica or MATLAB, and Design Expert to summarise analysis and interpretation of industry engineering data, and make appropriate conclusions based on such experimental and/or real-life industrial data;
4. Construct appropriate graphical displays of data and highlight the roles of such displays in data analysis, particularly the use of statistical software packages;
5. Plan and execute experimental programmes to determine the performance of programme relevant industrial engineering systems, and evaluate the accuracy of the measurements undertaken.
6. Demonstrate mastery of data analytics and statistical concepts by communicating the results of experimental and industry-case investigations, critically reasoned scientific and professional analysis through written and oral presentation.

Course Contents

Descriptive statistics, frequency distribution, populations and sample, central tendency, variance data sampling, mean, median, mode, mean deviation, percentiles, etc. Probability. Binomial, poisson hypergeometric, normal distributions, etc. Statistical inference intervals, test hypothesis and significance. Regression and correlation. Introduction to big data analytics and cloud computing applications. Introduction to the R language; R as a calculator; Vectors, matrices, factors, data frames and other R collections. Iteration and looping control structures. Conditionals and other controls. Designing, using and extending functions. The Apply Family. Statistical modelling and inference in R.

GET 306 RENEWABLE ENERGY SYSTEM AND TECHNOLOGY (3 Units C: LH 30; PH 45)

Learning Outcomes

1. Identify the types, uses and advantages of renewable energy in relation to climate change.
2. Design for use the various renewable energy systems.
3. Recognise and analyse the current energy systems in Nigeria, their impacts on development and the global energy demand and supply scenarios.
4. Appreciate the environmental impact of energy exploitation and utilisation, and pursue the sustainable development of renewable energy for various applications.
5. Recognise the exploitation, excavation, production, and processing of fossil fuels such as coal, petroleum and natural gas, and discuss the sources, technology and contribution to future energy demands of renewable energy.

Course Contents

Current and potential future energy systems in Nigeria and globally - resources, extraction, concepts in energy conversion systems; parallels and differences in various conversion systems and end-use technologies, with emphasis on meeting 21st-century national, regional and global energy needs in a sustainable manner. Various energy technologies in each fuel cycle stage for fossil (oil, gas, synthetic), nuclear (fission and fusion) and renewable (solar, biomass, wind, hydro, and geothermal). Energy types, storage, transmission and conservation. Analysis of energy mixes within an engineering, economic and social context. Sustainable energy; emphasize sustainability in general and in the overall concept of sustainable development and the link this has with sustainable energy as the fundamental benefit of renewable energy.

Practical Content: Simple measurement of solar radiation, bomb calorimeter determination of calorific value of fuels and biomass; measurement of the velocity of wind, waves and the energy that abound in them; laboratory production of biogas and determination of energy available in it; simple conversion of solar energy to electricity; transesterification of edible oil into biodiesel; simulation of geothermal energy; Geiger-Muller or Scintillation Counters' determination of uranium or thorium energy; simple solid or salt storage of energy; hybrid application of renewable energy.

GET 307 INTRODUCTION TO ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND CONVERGENT TECHNOLOGIES (3 Units C: LH 45)

Learning Outcomes

1. Explain the meaning, purpose, scope, stages, applications and effects of artificial intelligence;
2. Explain the fundamental concepts of machine learning, deep learning and convergent technologies.
3. Demonstrate the difference between supervised, semi-supervised and unsupervised learning.
4. Demonstrate proficiency in machine learning workflow and how to implement the steps effectively;
5. Explain natural languages, knowledge representation, expert systems and pattern recognition;
6. Describe distributed systems, data and information security and intelligent web technologies;
7. Explain the concept of big data analytics, purpose of studying it, issues that can arise with a data set and the importance of properly preparing data prior to a machine learning exercise; and
8. Explain the concepts, characteristics, models and benefits, key security and compliance challenges of cloud computing.

Course Contents

Concepts of human and artificial intelligence; artificial/computational intelligence paradigms; search, logic and learning algorithms. Machine learning and nature-inspired algorithms – examples, their variants and applications to solving engineering problems; understanding natural languages; knowledge representation, knowledge elicitation, mathematical and logic foundations of AI; expert systems, automated reasoning and pattern recognition; distributed systems; data and information security; intelligent web technologies; convergent technologies – definition, significance and engineering applications. Neural networks and deep learning. Introduction to python AI libraries.

TEL 305 ELECTRICAL MACHINES I (3 Units C: LH 45)

Learning Outcomes

1. At the end of the course the student should be able to: 1. explain operating principles of fundamental components of Electric Machines: motors, generators and transformers including synchronous, asynchronous, DC and special purpose motors, AC, DC generators and autotransformers, CTs, PTs, step-up and stepdown transformers;

2. Examine the magnetic field, reluctance of magnetic materials, flux and mmf in magnetic circuits and perform transformer analysis using standard testing procedures including open-circuit and short-circuit tests, voltage regulation, efficiency and circuit analysis involving transformers;
3. Examine construction, working principles, characteristics and equivalent circuit of three phase synchronous generators, synchronous motors and induction motors, single phase induction and special purpose motors; and
4. Analyse voltage-current characteristics, commutation of DC generators, torque speed characteristics and speed regulation of DC motors.

Course Contents

DC Machine, Introduction to Machinery Principles, Rotational motion, Newton's Law and power relationships, the Magnetic field, Magnetic Circuit with air gap, Faraday's law, Production of induced force on wire, Induced voltage on a conductor moving in a magnetic field, Linear DC machine.; DC Machinery Fundamentals: Simple rotating loop between curved pole faces, Commutation, Construction, Simple armature winding, Armature reaction, Interpoles, compensating winding and brush shifting, Internal generated voltage and induced torque equations of real machines; DC Generators, Introduction, Voltage regulation, Magnetization curve, Equivalent circuits, Working and characteristics of separately excited, shunt, series and compounded generators, Parallel operations of direct current generators; DC Motors, Introduction, Speed regulation, Equivalent Circuits, Working and Characteristics of separately excited, Shunt and Permanent magnet, Working and Characteristics of series and compounded motors, Torque-speed Equations, Efficiency calculations, Stepper Motor and Drive circuit.; AC Machines Topics, Transformer Fundamentals, Importance of transformers, Types and construction, The ideal transformer, Leakage reactance, Theory and operation of single phase transformer, Losses and phasor diagram, the equivalent circuit of a real transformer, No load Engineering and Technology 337 New and short circuit test, the per unit system, the transformer voltage regulation and efficiency, Autotransformers and concept of its power rating advantages, Current transformer (CT) and Potential transformer (PT), Three phase Transformers, Construction of power Transformer, Three phase connections and harmonics suppression, Vector groups, Three phase transformer using two transformers, Transformer ratings and related problems, Transformer Inrush Current, AC Machines Fundamentals, A simple loop in a uniform magnetic field, Review of three phase generation, Proof of the rotating magnetic field concept and its relation with no. of poles, the relationship between electrical and mechanical degree, the relationship between electrical frequency and the speed of the magnetic field rotation Induced voltage and induced torque, Losses and power flow diagram, Voltage regulation and speed regulation.; Synchronous Generator, Construction, Excitation system, Equivalent circuit of Synchronous Generator, Phasor diagram, Power and Torque, Measurement of model parameters, Effect of load changes on a generator, Parallel operation of generators; Synchronous Motor, Basic principle of motor operation, Equivalent circuit, Torque speed characteristics, Power and torque equation, Phasor diagram, the effects of load change, and field current change, Vcurves of synchronous motor and power factor correction, Starting of synchronous motor, Synchronous motor ratings; Three Phase Induction Motor, Construction, Basic concepts and working principles, Synchronous speed, Slip and its effect on rotor frequency and rotor voltage, Equivalent circuit, Power and torque, Torque speed characteristics, losses, efficiency and power factor; Single Phase and Special Purpose Motors, The Universal motor, Introduction to single phase induction motor, Starting single phase induction motors, Split phase windings, Capacitor start motor, Permanent split capacitor motor, Capacitor start and capacitor run motors, Shaded pole motors, Reluctance motors, the Hysteresis motor.

EEE 311 ELECTRIC CIRCUIT THEORY I

(2 Units C: LH 30)

Learning Outcomes

1. Analyse continuous time signals and systems.

2. Apply Laplace transforms techniques.
3. Apply network theorems practically.
4. Evaluation of two port networks.
5. Analyze positive real functions
6. Solve most simple and some complex circuits for their parameters (Voltage, current, power etc.) using different network theorems and transforms.

Course contents

Passive circuit elements: R, L, C, transformers; circuit theorems: Ohm's, KVL, KCL, loop current, node potential, superposition. Network response to step, ramp and impulses. Network functions: response to exponential, sinusoidal sources. Laplace transform and transfer functions: pole-zero configuration and application in solving circuits, resonance; two-port analysis and parameters.

EEE 321 ANALOGUE ELECTRONIC CIRCUITS I (2 Units C: LH 30)

Learning Outcomes

1. Acquire basic knowledge on the working principles of various semi-conductor devices such as diodes and BJTs
2. Develop capability in analysis of BJT and FET amplifier circuits
3. Develop competence in frequency response analysis of amplifiers
4. Design signal and power amplifiers using BJTs and FETs
5. Acquire knowledge on basic digital electronics circuits
6. Analyze and design combinatorial circuits

Course Contents

Single-stage transistor amplifiers using BJT and FET Equivalent circuits and calculation of current gain, voltage gain, power gain, input and output impedance. Operational Amplifiers: Description, parameters and applications. Feedback, broadband and narrowband amplifiers. Power amplifiers. Voltage and current stabilizing circuits. Voltage amplifiers, multi-stage amplifiers using BJTs and FETs.

EEE 322 DIGITAL ELECTRONIC CIRCUITS (2 Units C: LH 30)

Learning Outcomes

1. Understand Boolean Algebra, switching algebra, and logic gates
2. Simplify Boolean functions using Karnaugh Maps,
3. Design and analyze combinational logic circuits: adders, subtractors, code converters, parity checkers, encoders, decoders, multiplexers, BCD adders, and comparators
4. Design and analyze sequential logic circuits: latches and flip-flops, registers, synchronous and asynchronous counters, and memories
5. Understand characteristics of logic gate families
6. Use software tools to design digital electronics system
7. Analyze important electronic circuits (amplifiers, filters, oscillators)
8. Analyse and design wave-shaping sequential circuits
9. Understand various memory circuits, logic families (including TTL, ECL, RTL, DTL) and IC

Course contents

Number Systems and Codes. Logic Gate Simplification of Logic expressions using Boolean algebra. Simplification of Logic expressions using Karnaugh Method. Design of combinational circuit. Flip-Flops.

Application of Flip-Flops in the design of counter. Registers and timers. Switching and wave shaping circuits. Generation of non-sinusoidal signal (multivibrators). Introduction to ADC and DAC. Design of Logic Gates (Diode, DTL, TTL, ECL etc). Sequential circuits. Introduction to microprocessors

EEE 324 ELECTROMAGNETIC FIELDS AND WAVES I (2 Units C: LH 30)

Learning Outcomes

1. Derive wave equation from Maxwell's equation and understand the meaning of its solution.
2. Understand the meaning of field equivalent theorem.
3. Solve scattering problems in cylindrical coordinate system.
4. Understand the meaning of diffraction and scattering of electromagnetic wave.

Course Contents

Review of electromagnetic laws in integral form, Gauss's Law, Ampere's and Faraday's Laws. Electrostatic fields due to distribution of charge. Magnetic fields in and around current carrying conductors. Time-varying magnetic and electric fields. Conduction and displacement current. Maxwell's equations (in rectangular co-ordinates and vector-calculus notation). Derivation of Maxwell's equations, electromagnetic potential and waves. Poynting vector, boundary conditions. Wave propagation in good conductors, skin effect; plane waves in unbounded dielectric media.

EEE 326 ELECTRIC CIRCUIT THEORY II (2 Units C: LH 30)

Learning Outcomes

1. Calculate power in a.c circuits containing, Resistance, Inductance, Capacitance and combination of the resistance, inductance and capacitance.
2. Explain power factor and factors affecting its value.
3. Explain methods of power factor correction.
4. Explain apparent power, reactive power and active power
5. Solve problems on power factor, active power apparent power reactive power and power factor.
6. Explain the meaning of transient
7. Derive formulae for current and voltage growth and decay in RC circuits
8. Sketch the growth and decay curves in RC circuits
9. Define time constant in RC circuit
10. Solve problems involving transient in RC circuit

Course Contents

Non-linear circuit analysis. Network functions, Locus diagrams. Circuit synthesis: realisability criteria, Foster and Cauer syntheses of RC, RL, LC and RLC circuits. Filters: design, operation, low, high, bandpass. Butterworth and Chebychev filter design. Active network analysis and synthesis.

BU – EEE 304 MEASUREMENT AND INSTRUMENTATION (2 Units C: LH 30)

Learning Outcomes

1. Analyze the performance characteristics of each instrument
2. Understand the use AC and DC meters for measurement of DC and AC quantities.
3. Design simple instrumentation circuits with the DC and AC bridges.
4. Use of oscilloscope for measuring AC and DC quantities.
5. Generate and analyze signals with signal/function generator and signal analyzer, respectively.

6. Understand the use of A/D and D/A.

Course Contents

General Instrumentation and basic meter in DC measurement. Basic meter in AC measurements. Rectifier voltmeter. Electro-dynamometer and Wattmeter. Instrument transformers. DC and AC bridges and their applications. General form of AC bridge universal impedance bridge. Electronic instruments for the measurement of voltage. Current resistance and other circuit parameter electronic measurement instrument. Electronic voltmeters: AC voltmeters using rectifiers. Electronic multimeter. Digital voltmeters. Oscilloscope. Vertical deflection system and horizontal deflection system. Probes and sampling CRO. Instruments for generating and analyzing waveforms. Square-wave and pulse generator. Signal generators and function generators. Wave analysers. Electronic counters and their applications. Time base circuitry. Universal counter measurement modes. Analog and digital data acquisition systems. Tape recorders. D/A and A/D conversions. Sample and hold circuits.

GET 390 STUDENT INDUSTRIAL WORK EXPERIENCE I (4 Units C: 12 weeks)

Learning Outcomes

1. Demonstrate proficiency in at least any three softwares in their chosen career choices.
2. Demonstrate proficiency in some animation videos (some of which are free on YouTube) in their chosen careers.
3. Carry out outdoor hands-on construction activities to sharpen their skills in their chosen careers;
4. Demonstrate proficiency in generating data from laboratory analysis and develop empirical models.
5. Demonstrate proficiency in how to write engineering reports from lab work.
6. Fill logbooks of all experience gained in their chosen careers.
7. Write a general report at the end of the training.

The experience is to be graded and the students must pass all the modules of the attachment and shall form part of CGPA.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (Students are to proceed on three months of work experience i.e. 12 weeks during the long vacation following 300 level). Students are engaged in the more advanced workshops, indoor software design training similar to what they will use in the industry and outdoor construction activities to sharpen their skills. The use of relevant animation videos that mimic industrial scenarios is encouraged. Students are to write a report at the end of the training. As much as possible, students should be assisted and encouraged to secure 3 months placement in the industry. Examples of outline of activities and experiences to which students are expected to be exposed to earn prescribed credits include:

Section A: Welding and fabrication processes, automobile repairs, · lathe machine operations: machining and turning of simple machine elements, such as screw threads, bolts, gears, etc. Simple milling machine operations, machine tool maintenance and trouble-shooting, and wooden furniture making processes.

Section B: Mechanical design with computer graphics and CAD modelling and drafting.

Introduction to Solidworks: software capabilities, design methodologies and applications. Basics part modelling: sketching with SolidWorks, building 3D components, using extruded Bose base · Basic

assembly modelling, and SolidWorks drawing drafting. Top-down assembly technique exploded view, exploded line sketch. Introduction to PDMS 3D design software; AutoCAD mechanical, SPSS.

A comprehensive case study design project. The student should be introduced to the concept of product/component design and innovation and then be given a comprehensive design project.

Examples of projects should include the following:

1. Design of machine components;
2. Product design and innovation;
3. Part modelling and drafting in SolidWorks; and
4. Technical report writing.

BU – GST 400 RELIGION AND SOCIAL ETHICS

(3 Units C:LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Identify three (3) interrelatedness between religion and other social institutions;
2. Explain any five (5) effects of social changes on religion and ethics, since the 18th Century;
3. Evaluate any five (5) roles of religion in human and national development;
4. Explain any five (5) biblical approaches in developing a Christian worldview;
5. Illustrate five (5) uniqueness of the Bible in restoring social ethics and values in the society;
6. Demonstrate competence in providing biblical solution in five (5) areas of moral fluidity and/or ethical dilemma in your discipline and the society;
7. Explain any seven (7) biblical principles in personal, family, and/or professional life.

Course Contents

Religion and Society- Definitions. Culture. Traditions. Religions. Religion and Social changes. Role of Religion. Religion and Knowledge. Religion and Morality. Religion and Family Life. Religion and Gender Issues. Religion, Transgender and Homosexuality. Religion and Politics. Religion and Corrupt Practices. Religion and Violence. Religion and Environment. Religion, Food and Diet. Religion and Health. Religion, Education and the Bible. Religion and Business. Religion and Social Order. Religion and Sanctity of Life. Merits and Demerits of Religion. Formation of Christian Worldview. Biblical Principles in Personal, Family, and Professional Life – Theory and Practice.

Minimum Academic Standard

Standard University Library with updated textbooks

BU – GST 440 E-PROJECT MANAGEMENT & SIMULATION (1 Unit C: LH 20, PH 40)

Learning Outcomes

Upon completion of the course. students should be able to:

1. explain the project management processes
2. discuss the project management knowledge areas
3. demonstrate the formulas. charts. and theories of project management
4. calculate float for complex project network diagrams
5. memorize the formulas for earned value management
6. compare and contrast processes. knowledge areas. theories. and project management best practices

Course Content

Defining Project Management Fundamentals. Initiating the Project. Planning the Project. Preparing to Develop the Project Schedule. Developing the Project Schedule. Planning Project Costs. Planning Human Resources and Quality Management. Communicating During the Project. Planning for Risk. Planning Project Procurements. Planning for Change and Transitions. Executing the Project. Executing the Procurement Plan. Monitoring and Controlling Project Performance. Monitoring and Controlling Project Constraints. Monitoring and Controlling Project Risks. Monitoring and Controlling Procurements. Closing the Project.

Lab Work: Students will undertake the following tasks in the practical classes; work on stakeholders requirements. Create a risk response team. Create a detailed work plan. Develop communication effective plan. Develop both leadership and technical competencies. Monitor and track progress regularly. Look out for potential risks.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement facilities.

GET 402 ENGINEERING PROJECT I

(2 Units C: PH 90)

Learning Outcomes

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

3. Complete the design phase of a complex engineering problem sourced from industry or community during the SIWES III programme.
4. Demonstrate the connection between engineering product-making and the theoretical courses they have learned following the applicable industry best practices.

Course Contents

In the second semester of the 400-level students, preferably in groups, work from the university on the identified industry or organization to tackle industry complex engineering problems. Theoretical issues may be provided by the department faculty or industry experts. During the vacation, students will now work full time with the organisation/industry on the project as part of the SIWES III. The students can also go beyond the department and engage in multidisciplinary undertakings. Literature survey, review of existing systems etc. must be achieved to a satisfactory extent.

GET 404 ENGINEERING VALUATION AND COSTING

(2 Units C: LH 30)

Learning Outcomes

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

1. Identify at least three (3) objectives of engineering valuation work, valuer's primary duty and responsibility and valuation terminologies.
2. Describe at least four (4) Valuer's obligation to his or her client, to other valuers, and to the society.
3. Demonstrate with example the engineering valuation methods, valuation standards, and practices.
4. Prepare engineering valuation and appraisal reports and review
5. Discuss expert witnessing and ethics in valuation.
6. Determine price, cost, value, depreciation and obsolescence in real property, personal property, personal property, machinery and equipment, oil, gas, mines, and quarries valuation.

BU-EEE 402 ELECTROMAGNETIC FIELDS AND WAVES II

(2 Units C: LH 30)

Learning Outcomes

1. Understand the propagation of waves in free space and material media.

2. Understand the transmission line theory
3. Understand the principle and applications of waveguides and resonators.
4. Use Smith Chart to design and analyze transmission lines.
5. Analyze and design simple antenna

Course Contents

Propagation of electromagnetic waves in free space. Propagation of electromagnetic waves in material media. Propagation of electromagnetic waves in dielectrics. Propagation of electromagnetic waves in conductors. Propagation of electromagnetic waves in ionised media. Characteristic impedance. Transmission line theory. Transmission line terminations. Waveguides. Resonators. The Smith charts. Use of Smith charts. Single Stub. Double Stub. Radiating elements. Antenna theory. Special term paper on analysis of wave type.

BU-EEE 403 ELECTRIC POWER PRINCIPLES

(2 Units C: LH 30)

Learning Outcomes

1. Understand the various types of power station operation auxiliaries
2. Understand the economics of power operation and power supply.
3. Understand the power system tariffs
4. Understand the demodulation of different modulated signals.
5. Understand the DC and AC power distribution.
6. Understand the siting of generation plants

Course Contents

Types of power station operation auxiliaries. Economics of operation. Stations and substations. Power supply economics. Tariffs. Power factor correction. Polyphase theory. DC power distribution. AC power distribution. Network calculations. Overhead line conductors. Corona effect. Voltage control. Circuit breakers. Load forecast. Siting of generation plants. Term paper on electric power principle.

BU-EEE 404 ELECTRICAL MACHINES II

(3 Units C: LH 45)

Learning Outcomes

1. Understand the fundamental theory and principles of rotating machines.
2. Understand the equivalent circuit representation and analysis of Induction motors and synchronous machines.
3. To also introduce the students to the characteristics of motors and their applications at home and in the industry.
4. Understand the construction and design issues associated with electrical machines.

Course Contents

Synchronous generator: Constructional details — Types of rotors –winding factors- emf equation — Synchronous reactance — Armature reaction — Phasor diagrams of non salient pole synchronous generator connected to infinite bus–Synchronizing and parallel operation — Synchronizing torque - Change of excitation and mechanical input- Voltage regulation — EMF, MMF, ZPF and A.S.A methods — steady state power- angle characteristics– Two reaction theory –slip test -short circuit transients — Capability Curves. Synchronous motor: Principle of operation — Torque equation — Operation on infinite bus bars — V and Inverted V curves — Power input and power developed equations — Starting methods — Current loci for constant power input, constant excitation and constant power developed-

Hunting — natural frequency of oscillations — damper windings- synchronous condenser. Three phase induction motor: Constructional details — Types of rotors — Principle of operation — Slip –cogging and crawling- Equivalent circuit — Torque-Slip characteristics — Condition for maximum torque — Losses and efficiency — Load test — No load and blocked rotor tests — Circle diagram — Separation of losses — Double cage induction motors –Induction generators — Synchronous induction motor. Starting and speed control of three phase induction motor: Need for starting — Types of starters — DOL, Rotor resistance, Autotransformer and Star-delta starters — Speed control — Voltage control, Frequency control and pole changing — Cascaded connection-V/f control — Slip power recovery scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

Single phase induction motors and special machines: Constructional details of single phase induction motor — Double field revolving theory and operation — Equivalent circuit — No load and blocked rotor test — Performance analysis — Starting methods of single-phase induction motors — Capacitor-start capacitor run Induction motor- Shaded pole induction motor — Linear induction motor — Repulsion motor — Hysteresis motor — AC series motor- Servo motors- Stepper motors — introduction to magnetic levitation systems.

BU-EEE 405 CONTROL THEORY

(2 Units C: LH 30)

Learning Outcomes

1. Understand the basic concepts and examples of control system
2. Understand the concept of feedback control and its applications.
3. Carry out time responses analysis in simple control systems
4. Analyze simple control system stability
5. Design simple compensation system.

Course Contents

Basic concepts of control systems. Examples of control systems. Feedback of control systems. Time response analysis. Concept of stability. Routh-Hurwitz criterion. Root-locus techniques. Frequency-response analysis. Polar Plots. Bode plots. Nyquist stability criteria. Nichol's Chart. Compensation techniques chart. Compensation techniques. Introduction to non-linear systems. Examples of non-linear systems. Term paper in control systems.

BU-EEE 406 PRINCIPLES OF COMMUNICATION ENGINEERING

(3 Units C: LH 45)

Learning Outcomes

1. Describe and analyse some of the building blocks of modern communication systems.
2. Describe the concept and techniques for performing signal modulation in communication systems.
3. Analyse the performance of Amplitude Modulation (AM), Phase Modulation (PM) and Frequency Modulation (FM) systems.
4. Understand Pulse modulation systems: PAM, PWM, PPM and their generation, detection and applications.
5. Differentiate between multiplexing techniques.
6. Introduction to radio and TV transmission

Course Contents

Introduction to electronic communication: Elements of communication systems. Types of electronic communications. Baseband signals and baseband transmission. Modulation techniques. Bandwidth requirements. Amplitude Modulation Introduction. Equation of AM signal. Modulation index and percentage of modulation for sinusoidal AM. Frequency spectrum of the AM wave. Representation of AM wave. Average power for sinusoidal AM wave. Effective voltage and current for sinusoidal AM.

Modulation. Low and high level modulation and their comparison. Low modulator. High level modulator. Basic requirements. Modulator circuits: Collector modulator Class C Amplifier, Grid Modulated Class C Amplifier, Pulse Modulated Class C Amplifier. Amplitude modulated transmitters. Frequency Modulation: Frequency modulation theory, Characteristic of frequency modulation. Mathematical representation of frequency modulated wave. Frequency modulators. Pre-emphasis. De-emphasis. Directly modulated FM transmitter. Phase modulation. Indirect method of FM modulation. Wide and narrow band FM transmission. Advantages and disadvantages of FM. Comparison of FM and AM system. Comparison of FM and PM system. FM Receiver: FM receiver, Basic FM demodulators, Noise triangle in FM, Capture effect, FM stereo system. Pulse Modulation: Introduction, Classification of pulse modulation, Continuous vs discrete time signals, Sampling process, Pulse amplitude modulation, Pulse time modulation, Pulse position modulation, Comparison of PAM and PPM systems, Pulse code modulation, Multiplex transmission, Crosstalk, Comparison of FDM and TDM, Differential pulse code modulation, Delta modulation, Adaptive delta modulation, Sigma-delta A/D conversion. Comparison between PCM, DM, ADM and DPCM. Audio Communication: Microphones, Loudspeakers, Speakers enclosures and baffles. High Fidelity Systems. Stereophony. Tone control circuits. Public address systems. Recent trends in sound recordings. Telephony: Principles of telephony, Telephone transmitter and receiver, Side tone, Necessity for telephone exchange, Tones in telephony, Automatic exchange, Pulsed and DTMF dialing, Electronic telephone exchanges.

BU-EEE 407 POWER ELECTRONICS

(3 Units C: LH 45)

Learning Outcomes

1. Outline the characteristics of different power semiconductor switches.
2. Explain the principles of DC to DC, AC to DC, DC to AC and AC to AC conversions
3. Apply the Rectification and smoothing techniques
4. Explain the concept of voltage and current regulation.
5. Design simple thyristor circuits and apply the Thyristor devices
6. Explain the concept of Timing Circuits, Motor Control, and Control of Drives
7. Identify and apply the Power Translator and Integrated Circuits

Course Contents

Characteristics of semiconductor switches. Power conversion from AC to DC. Rectification and smoothing techniques. DC to DC Conversion. AC to AC conversion. Voltage and Current Regulation. Regulator Circuits. Thyristor devices. Application of Thyristor devices. Timing Circuits. Motor Control. Control of Drives. Heating and Lighting. Welding. Power Translator and Integrated Circuits. Mechanical relays. Solid State relays. Stepping Motors.

BU- GEG 403 SYSTEMS DYNAMICS AND SIMULATION

(3 Units C: LH 45)

Learning Outcomes

On the completion of the course, the students should be able to:

1. Explain with five (5) detailed examples the dynamics of a problem.
2. Formulate four (4) hypotheses about systems behaviour.
3. Apply with at least five (5) examples the graphical stock and flow structure and the causal loop diagrams as tools for effective modeling and simulation of dynamic engineering system.
4. Develop three (3) models that reproduce the structure-behaviour a real-life engineering problem using System Dynamics modeling platforms like VENSIM, STELLA, or POWERSIM.

5. Produce one (1) term paper on the functionality, reliability and usefulness of the model after development.

Course Contents

The purpose of modeling. Steps of the modeling process. Problem articulation. Formulating a dynamic hypothesis. Formulating a simulation model. Testing and design policy and evaluation. The concept of feedback. Modeling feedback with causal loop diagrams (CLDs). Simple structures: positive loop, negative loop, coupled loops, loop polarity, and shifts in loop dominance. Stocks and flows. The right level of aggregation. Model formulation (rate equations, auxiliary equations, table functions, levels, and delays). Interactions of the fundamental modes of dynamic behavior (S-shaped growth. S-shaped growth with overshoot, overshoot and collapse, stasis or equilibrium, randomness, chaos). Understanding of the model behavior. System guiding policy analysis. Case studies: modeling the environment, power supply system, water supply system, transportation system, innovation diffusion, growth of new products, urban planning, solid waste, and public health management, renewable energy, automation and control system, mechatronics, robotics, climate change, heating systems, sustainable fuels, etc. Minimum Academic Standards 37 The course is comprised of lectures, seminars, group discussions, students' presentations, modeling sessions and individual assignments/papers. An active participation and overall attendance rate of 80% in scheduled sessions is required, and in the group discussions, students' presentations, and seminars, and is required in those sessions. Simulation Software. VENSIM DSS, STELLA OR POWERSIM.

BU- GEG 404 NUMERICAL METHODS

(3 Units C: LH 45)

Course Learning Outcomes

At the end of this course the students should be able to:

1. Solve nonlinear polynomial equations in determining the roots by applying numerical methods such as Bisection, Newton Raphson method, Secant method.
2. Evaluate the Linear Systems of Equations by applying Gaussian Elimination, LU Decomposition, Gaus Seidel Methods
3. Apply Linear, Quadratic and Cubic Lagrangian Interpolation Formulae to solve interpolation problems.
4. Solve Linear and Nonlinear Ordinary and Partial Differential Equations by applying Euler method, Runge-Kutta
5. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Difference Method
6. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Volume Method
7. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Element Method Rayleigh Ritz
8. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Galerkin Finite Element Method
9. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Explicit, Semi Implicit and Implicit Finite Volume Method

Course Contents

Numerical Solution to Root Finding of Nonlinear Polynomial Equations – Bisection. Newton Raphson method and Secant method. Linear Systems of Equations – Gaussian Elimination. LU Decomposition and

Gauss Seidel Methods. Lagrangian Interpolation Formulae – Linear. Quadratic and Cubic. Numerical Solution to Ordinary Differential Equations – Euler method. Runge-Kutta. Numerical Solution to Ordinary Differential Equations Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Ordinary Differential Equations Three Dimensional Problems Using Finite Difference. Numerical Solution to Partial Differential Equations of Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Partial Differential Equations of Three – Dimensional Problems Using Finite Difference Method. Alternating Direct Implicit Three Dimensional Finite Difference Method (FDM). Numerical Solution to 35 Ordinary and Partial Differential Equations Using Finite Elements. Finite Volume Methods: Ritz. Finite Element Methods Rayleigh Ritz. Galerkin Finite Element Method. Explicit, Semi Implicit and Implicit Finite Volume Method.

GET 490 STUDENT INDUSTRIAL WORK EXPERIENCE III (4 Units C: 12 weeks)

Learning Outcomes

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 devise impactful solutions to them.
5. Exploit the opportunity to improve and utilise their acquired critical thinking and innate creativity skills, during the program and SIWES Seminar presentation respectively.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (24 weeks from the end of the first semester at 400-Level to the beginning of the first semester of the following session. Thus, the second semester at 400-Level is spent in industry). Each student is expected to work in a programme related industry, research institute or regulatory agencies etc, for a period of 6 months under the guidance of an appropriate personnel in the establishment but supervised by an academic staff of the Department. On completion of the training, the student submits the completed Log book on the experience at the establishment., Also, there will be a comprehensive report covering the whole of the student's industrial training experiences (GET 290, GET 399 and GET 499), on which a seminar will be presented to the Department for overall assessment.

BU – GST 500 SEMINAR ON ADVENTIST HERITAGE (3 Units; C; LH 30; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the four (4) dimensions/emphasis of Adventist education in relation to faith integration in teaching, learning, and life.
2. State at least seven (7) contributions of Ellen White to the Seventh-day Adventist Church

3. Assess five (5) benefits of Literature Ministry in relation to the Seventh-day Adventist Church mission
4. Analyze the meaning and implications of the Three Angels Messages
5. Assess Ellen G. White's counsels in relation any three (3) contemporary issues
6. Evaluate five (5) areas of Ellen White's counsels on Family life
7. Enumerate five (5) major contributions of Health Reforms, Health Institutions, and Medical Ministry to the growth of the Seventh-day Adventist Church
8. Develop at least two (2) community-based projects focused on service to humanity

Course Contents

Philosophy of Adventist Education. Harmonious Development. Biblical Foundation for Faith Integration. The Three Angels Messages. Spirit of Prophecy and Seventh-day Adventist Church. Ellen G. White's Conversion Story. E.G. White's Relationship with Jesus Christ. E.G. White's Writings and Contemporary Issues. Publishing Ministry. Family Life. Child Guidance. Health Ministry in Seventh-day Adventist Church. Health Reforms. Health Institutions. Healthy living. Alternative medicine. Medical Missionary. Health and Community Service. Dynamics of Community-based Projects. Benefits and Assessment of Community-based Projects.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts; Conferences/Unions/Division's Health and Publishing Departments of Seventh-day Adventist Church.

BU – GST 540 INTRODUCTION TO DIGITAL MARKETING (1 Units; C; LH 15; PH 45)

Learning Outcomes

- i. Be able to develop and execute a marketing plan. incorporating all elements of the marketing mix. segmentation and positioning strategies and other elements.
- ii. Have an understanding of the role of both digital and traditional media in marketing. and the intersection of online and offline strategies and tactics.
- iii. Be able to guide the development of a digital presence from a marketing point of view.
- iv. Be proficient in marketing analytics and quantitative evaluation of the marketing environment.
- v. Have working knowledge of website design and development.
- vi. Familiarize oneself with the fundamentals of social media & digital marketing
- vii. Learn how to use existing social & digital marketing tools to achieve marketing and organizational objectives
- viii. Understand the concepts for creating engaging content & drive online campaigns
- ix. Create a framework to audit the current state of the digital assets
- x. Be able to develop and execute a marketing plan. incorporating all elements of the

Course Content

Digital Marketing Strategy: How the Internet works. understanding marketing strategy. the building blocks of marketing strategy. Crafting a digital marketing strategy.

Market Research: The importance of market research. Key concepts in market research. Online research methodologies. Justifying the cost of research.

Content Marketing Strategy: Defining Content marketing. Strategic building blocks. Content creation. Content channel distribution.

User Experience Design: Understanding UX design. Core principles of UX design. Mobile UX. Step-by-step guide to UX design.

Web Development and Design: Web development. Mobile development. Step-by-step guide to building a website.

Writing for Digital: Writing for your audience. Types of web copy. HTML for formatting. SEO copywriting. best practices for online copywriting.

Customer Relationship Management: A CRM model. understanding customers. CRM and data. the benefits of CRM. Social CRM. Step-by-step guide to implementing a CRM strategy.

GET 501 ENGINEERING PROJECT MANAGEMENT (3 Units C: LH 45)

Learning Outcomes

At the end of the course, students should be able to:

1. explain the basics of project management as it relates to the Engineering discipline;
2. demonstrate knowledge and understanding of engineering, management and financial principles and apply these to their own work, as a member and/or leader in a team, to manage projects and in multi-disciplinary environments;
3. conduct, manage and execute projects in multi-disciplinary areas;
4. possess the skills needed for project management; and
5. work within the budget when executing a project for proper management.

Course Contents

Project management fundamentals – definitions, project environment, nature and characteristics, development practice, management by objectives, and the centrality of engineering to projects, infrastructures, national and global development. The scope of project management – organisational, financial, planning and control, personnel management, labour and public relations, wages and salary administration and resource management. Identification of project stakeholders; beneficiaries and impacted persons – functions, roles, responsibilities. Project community relations, communication and change management. Project planning, control and timeliness; decision making, forecasting, scheduling, work breakdown structure (WBS), deliverables and timelines, logical frameworks (log frames), risk analysis, role of subject matter experts (SMEs), role conflicts; Gantt Chart, CPM and PERT. Optimisation, linear programming as an aid to decision making, transport and materials handling. Monitoring and Evaluation – key performance indices (KPIs); methods of economic and technical evaluation. Industrial psychology, ergonomics/human factors and environmental impact considerations in engineering project design and management. Project business case - financial, technical and sustainability considerations. Case studies, site visits and invited industry professional seminars. General principles of management and appraisal techniques. Breakthrough and control management theory; production and maintenance management. Training and manpower development. The manager and policy formulation, objective setting, planning, organising and controlling, motivation and appraisal of results.

GET 502 ENGINEERING LAW (2 Units C: LH 30)

Learning Outcomes

Students will be able to:

1. Describe and explain the basic concept, sources and aspects of law;
2. Describe and explain the major differences between the various categories of law, courts and legal jurisdictions;
3. Describe and explain legal principles and their application in professional engineering design and management services and their professional liability implications; and

4. Develop reasoned analysis of real-life or hypothetical engineering scenarios using the legal principles undertake critical analysis of reliable information to develop, and practically present technical reports for use in varying judicial/quasi-judicial settings including as an expert witness.

Course Contents

Common Law: its history, definition, nature and division. Legislation, codification interpretation. Equity: definition and its main spheres. Law of contracts for Engineers: Forms of contract and criteria for selecting contractors; offer, acceptance, communication termination of contract. Terms of Contracts; suppliers' duties – Damages and other Remedies. Termination/cancellation of contract Liquidation and Penalties; exemption clauses, safety and risk. Health and Safety. Duties of employers towards their employees. Duties imposed on employees. Fire precautions act. Design for safety. General principles of criminal law. Law of torts: definition, classification and liabilities. Patents: requirements, application, and infringement. Registered designs: application, requirements, types and infringement. Company law. Labour law and Industrial Law. Business registration.

BU-EEE 502 DESIGN OF ELECTRICAL & ICT SERVICES (2 Units C: LH 30)

Learning Outcomes

1. Design and analyze simple lighting systems
2. Understand the choice of cables and conductors for power installations
3. Understand different wiring systems and accessories.
4. Understand the techniques for protection of low voltage installations
5. Carry out earthen testing in low voltage installations.

Course Contents

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

BU-EEE 503 ADVANCED COMPUTER PROGRAMMING & USE OF SIMULATION PACKAGES (2 Units C: LH 15; PH 45)

Learning Outcomes

1. Use numerical methods to analyse electrical/electronic circuits and systems
2. Write programme in FORTRAN, BASIC, MATLAB and C++ to simulate electrical/electronic circuits and systems.
3. Simulate simple electrical/electronic circuits using Pspice, Electronic Workbench, Proteus, Visio, Multism or EasyEDA.
4. Design and analyze simple digital systems using VHDL

Course Contents

Numerical iteration procedures. Revision of FORTRAN. BASIC and C++ application programs in computer aided design of Electrical systems. Use of MATLAB in system simulations. Circuit simulation

using software packages; Pspice. Electronic Workbench. Visio. Proteus. Multism. EasyEDA etc. Design and evaluation of digital systems using VHDL.

Introduction to MATLAB and their engineering applications. Introduction to AUTOCAD and their engineering applications. Introduction to simulation packages.

BU-EEE 504 DIGITAL SIGNAL PROCESSING

(2 Units C: LH 15; PH 45)

Learning Outcomes

1. Explain the Fourier and z-transforms and their applications.
2. Synthesize analogue and digital filters from network function.
3. Explain basic image processing concepts.
4. Synthesize different type of digital filters and analyse their performances

Course Contents

Discrete time signals. Types of discrete time signals. Elementary signals. Discrete time systems. Properties of discrete time systems. Z-transform. Digital Fourier transform. Fast Fourier transform. The approximation problem in network theory. Synthesis of low-pass filters. Spectral transforms and their application in synthesis of high-pass and band-pass filters. Digital filtering. Digital transfer function. Aliasing. One-dimensional recursive and non-recursive filters. Computer techniques in filter synthesis.

BU-EEE 505 RELIABILITY ENGINEERING

(2 Units C: LH 15; PH 45)

Learning Outcomes

1. Introduce concepts and methods in the field of reliability engineering
2. Use total quality management tools to measure and evaluate the quality of products
3. Perform reliability analysis of a system and designing the same
4. Differentiate between hardware and software reliability
5. Evaluate the use of reliability engineering for industrial activities.

Course Contents

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

BU-EEE 501 EMBEDDED SYSTEM DESIGN AND PROGRAMMING

(2 Units C: LH 30)

Learning Outcomes

On the completion of the course, students will be able to:

1. Analyze and explain the basic building blocks of embedded systems hardware;
2. Identify relevant components and building blocks for embedded solutions;
3. Evaluate different embedded system architectures;
4. Describe the hardware and software architecture of processors used in embedded systems
5. Use embedded system development platforms and environments;

6. Specify relevant embedded systems requirements such as memory, processor speed and energy consumption;
7. Develop experience in assembler and C programming languages (5); and
8. Build embedded system solutions with the help of common hardware interface units

Course Contents

Introduction to microcomputers and embedded systems. Processor architectures. microcontrollers used in embedded systems. CPU. memory and input output units. Interrupts. Introduction to hardware level programming of embedded systems. Programming in assembler. Programming in C. Development platforms for embedded software. Introduction to microcomputer interfaces. Digital I/O. Serial I/O. Timers. Analog to-digital conversion. Pulse Width Modulation (PWM).

EEE 590 FINAL YEAR PROJECT

(6 Units C: LH/PH 270)

Learning Outcomes

The student(s) will develop a technology and/or system to solve a known and significant electronic engineering problem and design, and if possible/practicable, build/produce/manufacture some relevant new hardware/device(s) representing the solution using the skills acquired in the programme.

Course Contents

Individual student or group of students' projects undertaken to deepen knowledge, strengthen practical experience and encourage creativity, entrepreneurship and independent/team work (as may be the case). The project ends in a comprehensive written report of a developed system, and/or product/service and oral presentation/defense before a panel of assessors one of whom must be external to the University awarding the electronic engineering degree.

ELECTIVES

POWER AND MACHINE OPTIONS

BU-EEE 511 POWER SYSTEM COMMUNICATION AND CONTROL (2 Units C: LH 30)

Review of transmission line theory, high frequency communication on power lines. Carrier systems and power line carrier applications. Multiplexing. Telemetry, signal processing and data transmission. Control of power generation. Voltage control, system stability, automatic voltage regulators, regulating transformers.

BU-EEE 512 ELECTRICAL ENERGY CONVERSION AND STORAGE (2 Units C: LH 30)

Learning Outcomes

1. Assess the cost of generation for conventional and renewable energy plants
2. Design wind and solar power systems
3. Design charge controllers for efficient operation of storage systems
4. Develop mathematical models of renewable energy sources
5. Design an appropriate system for standalone and grid connected operation and apply energy storage devices

Course Contents

Electromechanical energy conversion, sources of motive power. Waste heat recovery. Solar energy nuclear power other sources of energy. Wind, geothermal, primary and secondary cells, cars and heavy vehicle batteries, testing, fault diagnosis, repairs effect of environmental factors on battery life, small-scale power sources.

BU-EEE 513 COMPUTER APPLICATION IN POWER SYSTEMS (2 Units C: LH 30)

Learning Outcomes

1. Analyze a control problem and suggest appropriate system architecture.
2. Analyze the need for information exchange and suggest appropriate information models and protocols.
3. Develop simple software for a controller.
4. Analyze the information needed for a given automation and control function for power systems.
5. Create consistent information models for power systems control

Course Contents

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

BU-EEE 514 SWITCHGEAR AND HIGH VOLTAGE ENGINEERING (2 Units C: LH 30)

Learning Outcomes

1. Understand the basic theory of high-voltage engineering
2. Explain the operating principles of high-voltage and large-power apparatuses or other electronic devices
3. Understand measurement and evaluation methods for high voltage or large current,
4. Compute the basic breakdown phenomena and analyze the transient circuit phenomena in high-voltage and large-power apparatuses using software tools

Course Contents

Generation and measurement of high voltage and current. Breakdown theories for gaseous liquid and solid dielectrics. Lightning phenomenon. High voltage equipment, insulation coordination, lightning protection, electric cables and condensers.

ELECTRONICS AND TELECOMMUNICATIONS OPTION

BU-EEE 521 SATELLITE COMMUNICATIONS

(2 Units C: LH 30)

Learning Outcomes

1. Good at fundamentals of satellite communications link design and provides an overview of practical considerations.
2. Explain topics such as satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple access, and Earth station design.
3. Described and analyzed the existing systems, including direct broadcast satellites, VSAT links, and Earth-orbiting and deep space spacecraft.
4. Aware of different orbits such as LEO, MEO, GEO and their advantages.

Course Contents

Satellite Communication: Types (LEO, GEO, etc), orbits, frequency bands, applications, and services. Antennas: types, gain, pointing loss, G/T, EIRP; high power amplifiers; low noise amplifiers; BUC/LNB: conversion process, polarization hopping, redundancy configurations; earth station monitoring and control. Basic link analysis, attenuation, sources of interference, carrier to noise and interference ratio, system availability, frequency reuse, link budget, link design. Multiple access techniques. VSAT networks: Technologies, network configurations, multi-access and networking, network error control, polling VSAT networks. Mobile radio systems: radio paging, cordless telephones, cellular radio. Trends in cellular radio and personal communications. Standards and overview of analogue and digital cellular systems: AMPS, TACS, GSM, CT2, PCN, DECT, PHS. Frequency management and channel assignment. GSM: Architecture, elements, and standard interfaces; FDMA/TDMA structure. Third and fourth Generation Wireless Standard. Global Positioning System: principles, and applications.

BU-EEE 522 BROADCASTING AND INTERNET TECHNOLOGY (2 Units C: LH 30)

Learning Outcomes

1. Understand the basics of broadcasting systems and role of regulators
2. Design and configure CATV, MATV, etc broadcast systems
3. Describe and differentiate working principles of digital TV technologies
4. Understand the internet technology, including architecture, addressing and broadcasting

Course Contents

Elements of broadcasting system. Studio: Design, acoustic, and equipment. Broadcasting regulations. Frequency spectrum: allocation, assignment, and licencing. Regulatory bodies. Design, configuration, and services of CATV, MATV, MMDS systems. Multipath problems. Polarization, field strength, and footprint. Transmitter power rating, beamwidth, interference and minimum separation. Frequency spectrum management of digital and analogue broadcasting. Antenna design and installation for radio, television, and satellite. Antenna support: Mast, Tower, High altitude design and application. Digital Audio Broadcasting. Analogue television standards: Digital Television standards: MPEG, DVB, channel coding techniques. HDTV. Digital television/Monitor set: LCD, and Plasma technology. Internet Technology: The Internet, definition and services. Internet architecture, OSI layers, TCP/IP, Internet addressing, IPv4, IPv6. Internet broadcasting: principles, components, standards, and applications.

BU-EEE 523 INDUSTRIAL ELECTRONICS DESIGN

(2 Units C: LH 30)

Learning Outcomes

1. Learn about the latest electronic devices available in industry
2. Be able to effectively provide detailed explanation to the structure and operation of common linear components.
3. Report on observations made on electronic circuits
4. Learn about the digital ICs and sensory electronic devices
5. Use tools/test equipment to analyze electronic components
6. Perform basic electronics troubleshooting

Course Contents

Characteristics and industrial applications of thyristors and other SCR devices. Transducers and their applications in sensing light, voltage, pressure, motion, current, temperature etc. mechanical relays, solid state relays and stepping motors. Real-time control and remote control concepts in instrumentation. Micromotors. Microprocessor and microcomputer based systems. Fire alarms, burglar alarms and general home and industrial instrumentation.

BU-EEE 524 MICROCOMPUTER HARDWARE AND SOFTWARE TECHNIQUES

(2 Units C: LH 30)

Learning Outcomes

1. Describe the general architecture of a microcomputer system and architecture.
2. Understand the interfacing of memory.
3. Understand the architecture and operation of programmable interface devices.
4. Program microcontroller devices- including PIC, Arduino.

Course Contents

Comparison of hardwired vs programmable digital systems. Von Neuman architecture. Block diagram of digital computer and description of its components. Single Address machine. 162 Micro-processor system: CPU, memory, I/O, and buses subsystems using INTEL & MOTOROLA families and their programming models. Interrupt system. Memory system: static, dynamic, VRAM and applications. Memory inter-facing and address decoding. 8031 microcontroller and programming. PIC micro-controller and programming. Interfacing to microcomputer, microprocessor, microcontroller, and PIC. Software: monitor and device driver for embedded system.

COMPUTER AND CONTROL ENGINEERING OPTION

BU-EEE 531 DIGITAL COMPUTER NETWORKS

(2 Units C: LH 30)

Learning Outcomes

1. After completing this course the participant will be able to:
2. Understand basic computer network technology.
3. Discuss Data Communications System and its components.
4. Identify the different types of network topologies and protocols.
5. Describe the layers of the OSI model and TCP/IP, and explain the function(s) of each layer.
6. Describe the different types of network devices and their functions within a network.

7. Explain the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Contents

Communication within computer systems: addressing and databases. CPU - memory - I/O device communications. Communication between systems: host/host versus host/slave relationships, handshaking protocols and synchronisation. Serial versus parallel communications. Hardware elements of network design - terminals, modems, multiplexors, and concentrators. Message and control processors. Communication equipment and carriers. Software elements of computer networks: host operating systems. Message and packet switching. Structure of computer networks: star, ring, and hierarchical networks. Decentralised networks.

BU-EEE 532 DIGITAL COMMUNICATION PRINCIPLES

(2 Units C: LH 30)

Learning Outcomes

1. Explain the role of various components of digital communications systems.
2. Analyse communication systems in both the time and frequency domains.
3. Model digital communication signals and systems using appropriate mathematical techniques (e.g., probability, random process, signal-space analysis, constellation diagram, trellis diagram).
4. Analyse the performance of digital modulation schemes over AWGN channels and select and construct appropriate modulation schemes according to design criteria.
5. Characterise error-control codes and apply the encoding and decoding processes.
6. Provide sound evaluation of practical digital communication systems in terms of their performance and complexity.
7. Simulate digital communication systems in a proficient and confident manner.
8. Explain and analyse error correcting codes, including block codes.

Course Contents

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

BU-EEE 533 ADVANCED ELECTRONIC CIRCUITS

(2 Units C: LH 30)

Learning Outcomes

1. Analyse electronic systems built using discrete components and integrated circuits.
2. Implement power electronic converters.
3. Design radio frequency and communication circuits with filters and oscillators.
4. Analyse and design multistage feedback and instrumentation amplifiers.

Course Contents

Analysis and design of integrated operational amplifiers, multipliers and advanced circuits such as wide-band amplifiers, instrumentation amplifier circuits, voltage controlled oscillators and phased locked loop. Design techniques for advanced analogue circuits containing transistors and operational amplifiers.

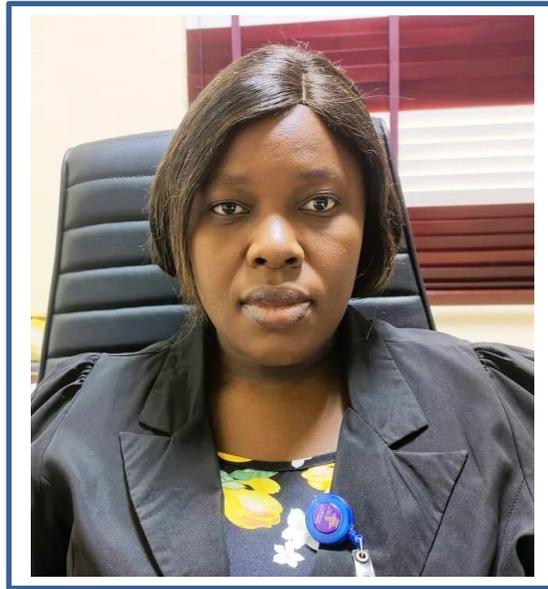
Outcomes

1. Ability to implement a feedback control system based on a mathematical description
2. Defines Z- transform.
3. Explains solving of linear, time invariant differential equations.
4. Interprets block diagrams and realizes transfer functions.
5. Ability to analyze a digital control system.
6. Ability to design, for implementation, specific control systems.
7. Explain Neural Network and fuzzy control system.

Course Contents

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

DEPARTMENT OF MECHANICAL ENGINEERING



Engr. Shade O. ADEMOKOYA
Acting Head of Department

BACHELOR OF MECHANICAL ENGINEERING (B.ENG.)

PHILOSOPHY OF THE DEPARTMENT

The field of Mechanical Engineering Department is aimed at producing job ready engineers in the field of production, design, industrial, thermal engineering, mechanics, kinematics, fluid mechanics and energy. Thus, the department is aimed at training and producing students to make relevance in these fields by imparting science and engineering education to be proficient in the analysis, design and synthesis of systems. Students that will use the principles of energy, materials, and mechanics to design and manufacture machines and devices of all types and create the processes and systems that drive technology and industry.

DEPARTMENT OBJECTIVES

- i. To provide facilities and scholar activities this will strengthen the institutional reputations and prepare students for diverse professional careers.
- ii. To provide a continual education and technical competence of students to solve engineering problems with consistence in the ethics of the profession.
- iii. To produce successful mechanical engineers with emphases on utilizing technology for innovative and sustainable solutions.
- iv. To equip students with necessary workshop practices and necessary tools for the technological know-how.

VISION STATEMENT

To be regional, national and international recognized in producing innovative and creative mechanical engineers with integrity and strive for excellence.

MISSION STATEMENT

To educate, prepare, inspire and mentor students to excel in the Mechanical Profession on the platform of biblical faith. To be recognized globally for outstanding education, research, practical and innovation in Mechanical Engineering.

ADMISSION REQUIREMENTS

Candidates are admitted into the degree programme in any 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 five year degree programme, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy all the following conditions –

- a. A minimum of Credit level (C6) pass in at least 5 subjects, including English Language; Mathematics, Physics, Chemistry and any other acceptable science subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.

It is also desirable for candidates to have Further Mathematics and Technical Drawing at credit levels. This will be an added advantage.

- b. Acceptable score in the Unified Tertiary Matriculation Examinations (UTME). The subjects shall be Mathematics, Physics, Chemistry and English Language.
- c. In addition, candidates with acceptable Unified Tertiary Matriculations Examinations (UTME) results will further be screened to ascertain suitability for admission into Babcock University.

Direct Entry Mode

For four year Direct Entry, candidates with post-secondary qualifications may apply for admission into 200 Level for the relevant undergraduate programmes having satisfy the following three conditions –

- a. Candidates must satisfy the 5 credits ‘O’ Level requirements in English Language; Mathematics, Physics, Chemistry and any other one relevant subjects is also required in West African Senior Secondary School Certificate (SSSC); General Certificate of Education (GCE) Ordinary Level (O’L) or equivalent, National Examinations Council (NECO), at not more than two sittings.
- b. 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 through Direct Entry. Candidates who have good National Diploma (ND) result, minimum of Upper Credit in

relevant Engineering Technology programmes from recognized institution may also be considered for admission into 200 level.

- c. Direct entry candidates must also satisfy the UTME requirements.

COURSE DURATION

This undergraduate programme will run for 10 semesters (5 academic sessions) for full time and 8 semesters (4 academic sessions) for Direct Entry students.

GRADUATION REQUIREMENTS

The following regulations shall govern the conditions for the award of a honours degree in Engineering and Technology:

1. candidates admitted through the UTME mode shall have registered for a minimum of 150 and maximum of 180 units of courses during the 5-year engineering degree programme. Such candidates shall have spent a minimum of ten academic semesters;
2. candidates admitted through the Direct Entry mode shall have registered for a minimum of 120 and a maximum of 150 units of courses during a 4-year engineering degree programme. Such candidates shall have spent a minimum of eight academic semesters;
3. candidates admitted through the Direct Entry mode at 300-Level shall have registered for a minimum of 90 and a maximum of 120 units of courses during a 3-year engineering degree programme. Such candidates shall have spent a minimum of 6 academic semesters;
4. The minimum and maximum credit load per semester is 16 and 24 credit units respectively; a student shall have completed and passed all the Courses registered for, including all compulsory courses and such elective /optional courses as may be specified by the university/faculty or department; obtained a minimum Cumulative Grade Point Average (CGPA) specified by the university but not less than 2.00; and
5. a student shall also have earned the 11 credit units of Students Industrial Work Experience Scheme (SIWES), 8 credit units of University General Study courses and four credit units of Entrepreneurship courses.

GLOBAL COURSE STRUCTURE

LEVEL	GST/ENT/GST	BASIC SCIENCE	DISCIPLINE GET/GEG	DEPARTMENTAL COURSES (MEE)	SIWES	TOTAL
100	11	25	3	4	-	43
200	11	-	28	3	3	45
300	9	-	21	12	4	46
400	4	-	10	19	4	37
500	4	-	5	28	-	37
TOTAL	39	25	67	66	11	208

LEVEL	1ST SEMESTER	2ND SEMESTER	TOTAL
100	20	23	43
200	24	21	45
300	22	24	46
400	19	18	37
500	17	20	37
TOTAL	102	106	208

BACHELOR OF MECHANICAL ENGINEERING (B.ENG.)

100 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS CORE/ELECTIVE	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
GST 111	Communication in English	C	2	-
GST 112	Nigerian Peoples and Culture	C	-	2
BU – GST 105	Use of Library and Study Skills	C	2	-
BU – GST 112	Health Principles	C	-	1
BU – GST 120	ICT Fundamentals and Office Productivity Management	C	1	-
BU – GST 126	Life and Teachings of Christ the Messiah	C	-	3
CHM 101	General Chemistry I	C	2	-
CHM 102	General Chemistry II	C	-	2
CHM 107	General Practical Chemistry I	C	1	-
CHM 108	General Practical Chemistry II	C	-	1
MTH 101	Elementary Mathematics I	C	2	-
MTH 102	Elementary Mathematics II	C	-	2
MTH 103	Elementary Mathematics III	C	2	-
PHY 101	General Physics I	C	2	-
PHY 102	General Physics II	C	-	2
PHY 103	General Physics III	C	2	-
PHY 104	General Physics IV	C	-	2
PHY 107	General Practical Physics I	C	1	-
PHY 108	General Practical Physics II	C	-	1
STA 112	Probability I	C	-	3
GET 101	Engineer in Society	C	1	-
GET 102	Engineering Graphics and Solid Modelling I	C	-	2
MEE 101	Introduction to Mechanical Engineering	C	2	-
BU-MEE 102	Workshop Practice in Mechanical Engineering	C	-	2
	TOTAL (43 Credits)		20	23

BACHELOR OF MECHANICAL ENGINEERING (B.ENG.)

200 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS CORE/ELECTIVE	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
ENT 211	Entrepreneurship and Innovation	C	2	-
GST 212	Philosophy, Logic and Human Existence	C	-	2
BU – GST 200	Communication in French	C	-	1
BU – GST 215	Adventist Heritage	C	3	-
BU – GST 220	Origin of Science	C	-	1
BU – GST 221	Introduction to Agriculture	C	1	-
BU – GST 290	Introduction to Data Analytics	C	1	-
GET 201	Applied Electricity I	C	3	-
GET 202	Engineering Materials	C	-	3
GET 203	Engineering Graphics and Solid Modeling II	C	2	-
GET 204	Student Workshop Practice	C	-	2
GET 205	Fundamentals of Fluid Mechanics	C	3	-
GET 206	Fundamentals of Thermodynamics	C	-	3
GET 207	Applied Mechanics	C	3	-
GET 208	Strength of Materials	C	-	3
GET 209	Engineering Mathematics I	C	3	-
GET 210	Engineering Mathematics II	C	-	3
GET 211	Computing and Software Engineering	C	3	-
*GET 290	SIWES I	C	-	3
	TOTAL (45 Credits)		24	21

*GET 290 – Student Work Experience Scheme – 9 Weeks

BACHELOR OF MECHANICAL ENGINEERING (B.ENG.)

300 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS CORE/ELECTIVE	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
ENT 312	Venture Creation	C	-	2
GST 312	Peace and Conflict Resolution	C	-	2
BU – GST 310	Data Analysis Using Advanced Excel SPSS POWER BI TABLEAU	C	1	-
BU – GST 312	Family Life	C	-	1
BU – GST 317	Fundamentals of Christian Faith	C	3	-
GET 301	Engineering Mathematics III	C	3	-
GET 302	Engineering Mathematics IV	C	-	3
GET 304	Technical Writing and Communication (including Seminar Presentation Skills)	C	-	3
GET 305	Engineering Statistics and Data Analytics	C	3	-
GET 306	Renewable Energy System and Technology	C	-	3
GET 307	Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies	C	3	-
TEL 305	Electrical Machines I	C	3	-
MEE 301	Computer-Aided Design and Manufacture	C	3	-
BU-MEE 301	Mechanical Engineering Design I	C	-	3
BU-MEE 302	Control System in Mechanical Engineering	C	3	-
BU-MEE 304	Introduction to Mechatronics	C	-	3
*GET 390	SIWES II	C	-	4
	TOTAL (43 Credits)		22	24

*GET 390 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF MECHANICAL ENGINEERING (B.ENG.)

400 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS CORE/ELECTIVE	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 400	Religion and Social Ethics	C	3	-
BU – GST 440	E-Project Management And Simulation	C	1	-
GET 402	Engineering Project I	C	-	2
*GET 404	Engineering Valuation and Costing	C	-	2
MEE 401	Mechanical (Machine) Engineering Design II	C	2	-
MEE 402	Theory (Mechanics) of Machines I	C	-	2
MEE 403	Applied (Engineering) Thermodynamics	C	2	-
MEE 404	Applied Fluid Mechanics	C	-	2
MEE 405	Heat and Mass Transfer	E	3	-
MEE 407	Advanced Mechanics of Materials	C	2	-
BU – MEE 407	Engineering Metallurgy	C	3	-
BU – MEE 408	Fluid Dynamics	C	-	3
BU – GEG 403	Systems Dynamics and Simulation	C	3	-
BU – GEG 404	Numerical Methods	C	-	3
*GET 490	SIWES III	C	-	4
	TOTAL (37 Credits)		19	18

*GET 404 – Engineering Valuation and Costing – 6 Weeks

*GET 490 – Student Work Experience Scheme – 12 Weeks

BACHELOR OF MECHANICAL ENGINEERING (B.ENG.)

500 LEVEL COURSES

COURSE CODE	COURSE TITLE	STATUS CORE/ELECTIVE	SEMESTER	
			1 ST	2 ND
GST 001.002	Citizenship Orientation	C	0	0
BU – GST 500	Seminar on Adventist Heritage	C	3	-
BU – GST 540	Introduction to Digital Marketing	C	-	1
GET 501	Engineering (Project) Management	C	3	-
GET 502	Engineering Law	C	-	2
MEE 501	Applied Design	C	2	-
BU-MEE 501	Automation and Control Engineering	C	3	-
BU-MEE 502	Automotive Technology	C	-	3
BU-MEE 503	Solar Powered Manufacturing and Service	C	3	-
BU-MEE 504	Refrigeration and Air Conditioning Technology	C	-	3
BU-MEE 505	Introduction to Biomechanics	E	-	2
MEE 590	B.Eng. Project	C	-	6
OPTIONS				
Solid Mechanics				
BU-MEE-511	Theory of Elasticity & Plasticity	C	3	-
BU-MEE-512	Fracture of Structural Materials	C	-	3
Design and Production				
BU-MEE-521	Industrial and Production Engineering	C	3	-
BU-MEE-522	Engineering Design and Manufacturing Processes	C	-	3
Thermo-Fluids				
BU-CEE 511	Building Services Engineering	C	3	-
BU-MEE 532	Turbomachinery	C	-	3
	TOTAL (37 Credits)		17	20

Note –

- The Student are to pick one option.

**B. Eng. MECHANICAL ENGINEERING
COURSE DESCRIPTIONS**

GST 001,002 CITIZENSHIP ORIENTATION

0, 0

These are non-credit, but mandatory seminars where students are mentored in all aspects of Christian life. It discusses many topics with the hope of modeling best moral practices on students. Students received either a satisfactory or unsatisfactory grade at the end of the semester.

GST 111 COMMUNICATION IN ENGLISH

(2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Identify possible sound patterns in English Language;
2. List notable language skills;
3. Classify word formation processes;
4. Construct simple and fairly complex sentences in English;
5. Apply logical and critical reasoning skills for meaningful presentations;
6. Demonstrate an appreciable level of the art of public speaking and listening; and
7. Write simple and technical reports.

Course Contents

Sounds and sound patterns in English Language (vowels and consonants, phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). major word formation processes; the sentence in English (types: structural and functional). grammar and usage (tense, concord and modality). Reading and types of reading, comprehension skills, 3RsQ. Logical and critical thinking; reasoning methods (logic and syllogism, inductive and deductive argument, analogy, generalization and explanations). Ethical considerations, copyright rules and infringements. Writing activities (pre-writing (brainstorming and outlining). writing (paragraphing, punctuation and expression). post- writing (editing and proofreading). Types of writing (summary, essays, letter, curriculum vitae, report writing, note-making). Mechanics of writing. Information and Communication Technology in modern language learning. Language skills for effective communication. The art of public speaking.

GST 112 NIGERIAN PEOPLES AND CULTURE

(2 Units C: LH 30)

Learning Outcomes

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

1. Analyze the historical foundation of Nigerian cultures and arts in pre-colonial times;
2. Identify and list the major linguistic groups in Nigeria;
3. Explain the gradual evolution of Nigeria as a political entity;
4. Analyze the concepts of trade and economic self-reliance of Nigerian peoples in relation to national development;
5. Enumerate the challenges of the Nigerian state regarding nation building;
6. Analyze the role of the judiciary in upholding fundamental human rights
7. Identify the acceptable norms and values of the major ethnic groups in Nigeria; and
8. List possible solutions to identifiable Nigerian environmental, moral and value problems.

Course Contents

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and cultures; peoples and cultures of the minority ethnic groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concepts of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigerian peoples; trade, skill acquisition and self-reliance). Social justice and national development (definition and classification of law); Judiciary and fundamental rights. Individuals, norms and values (basic Nigerian norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts [Cultism, kidnapping and other related social vices]). Re-orientation, moral and national values (The 3Rs – Reconstruction, Rehabilitation and Re-orientation; re-orientation strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

BU – GST 105 USE OF LIBRARY AND STUDY SKILLS (2 Units: C: LH 30)

Learning Outcomes

Upon completion of this course, students would have learnt to:

1. Explain the origin of three writing materials from the ancient to information age
2. Explain four types of libraries
3. Explain six importance of libraries in the educational and learning process
4. Explain five importance of Libraries and Information in the Educational and Learning Process
5. Discuss five Sections in the Library and functions performed
6. Explain two Classification Scheme & Library Catalogues
7. Explain four Information Search Tools
8. State four social issues relating to Libraries and rules for users
9. Explain two reference styles

Course Contents

Ancient period to Information age. Evolution of writing Materials. Concept of library. Types of library and information centers. Sections in the library. Parts of book. Electronic Information Resources. Bibliographic entries. Bibliographic control. Library Catalogue. Filing Shelving. Shelve reading. Library automation. Library software applications. Information networking and sharing. How to study. The brain. Memory retention mechanism. Search tools. Information retrieval tools. Reference styles. Social issues relating to Libraries and Information centers. Preparation for academic success.

Minimum Academic Standard

Library

BU – GST 112 HEALTH PRINCIPLES (1 Unit: C: LH 15)

Learning Outcomes

On completion of the course, students should be able to:

1. Define health according to World Health Organisation
2. State five (5) components and the human body and their function

3. Describe at least three (3) determinants of health and well-being
4. List five (5) factors that mental health
5. Explain two (2) current health trends

Course Contents

Meaning of health. Ecology of human disease. Biblical foundation health. Determinants of health. Basic human anatomy and physiology. Body defense mechanism. Element of nutrition. Health implication of nutrition for health. Personal and environment hygiene. Environmental pollution. Substance Abuse. Health implication of substance abuse. Mental health and well- being. Stress coping mechanism. Body pH and Health. Current trends in Health. Sport health and physical activity.

Minimum Academic Standards

Nil

BU – GST 120 ICT FUNDAMENTALS & OFFICE PRODUCTIVITY MANAGEMENT (1 Unit: C: LH 15, PH 45)

Learning Outcome

On completion of the course, students should be able to:

Word:

- i. creating text documents
- ii. editing and formatting the existing documents
- iii. making a text document interactive with different features and tools
- iv. graphical documents, comprising images
- v. used by Authors and Researchers
- vi. detect grammatical errors in a text document.

Excel:

- i. perform data entry and storage
- ii. collection and Verification of business data
- iii. administrative and managerial duties
- iv. accounting and budgeting
- v. data Analysis
- vi. reporting + Visualizations
- vii. forecasting.

PowerPoint:

- i. create presentations from scratch or a template
- ii. add text, images, art, and videos
- iii. select a professional design with PowerPoint Designer.

Course Content

Word:

Getting started with word. Adding tables. Controlling page appearance. Formatting text and paragraphs. Inserting graphic objects. Managing lists. Preparing to publish. Working more efficiently. Controlling the

follow of a document. Customizing formats using styles and themes. Inserting content using quick parts. Organizing content using tables and charts. Simplifying and managing long documents. Using mail merge. Using templates to automate document formatting.

PowerPoint:

Getting started with PowerPoint. Preparing a PowerPoint presentation. Performing advanced text editing operations. Adding graphical elements to your presentation. Modifying objects in your presentation. Adding tables to your presentation. Adding charts to your presentation. Preparing to deliver your presentation. Adding SmartArt math equations to a presentation. Collaborating on a presentation. Customizing a slide show. Customizing design templates. Modifying the PowerPoint environment. Securing and distributing a presentation. Working with media and animations.

Excel:

Getting started with excel. Formatting a worksheet. Managing workbooks. Modifying a worksheet. Performing calculations. Printing workbooks.

Lab Work: Students will undertake the following tasks in the practical classes; Learn how to use Microsoft Word to create resumes, reports, and write letters & as a simple text editor.

Learn how to use MS Excel in business analysis, managing lists of people, operations management, and performance reporting & for office administration, project management, and managing programs, contracts and accounts.

Learn how to use PowerPoint to create a slideshow of valuable information through charts, and images for a presentation.

Minimum Academic Standard: Computer studio and simulation Laboratory with NUC-MAS requirement facilities.

BU – GST 126 LIFE AND TEACHINGS OF CHRIST THE MESSIAH (3 Units: C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the historicity of Jesus Christ, using at least five (5) biblical and extant literature;
2. Explore five (5) religio-political and socio-economic events in Palestine during Jesus' time.
3. Enumerate five (5) evidences that Jesus Christ came at the fullness of time;
4. Identify at least three (3) theological implications of the Incarnation;
5. Contrast between Jewish and Jesus' views of the Kingdom;
6. Enumerate any seven (7) teachings of Jesus Christ;
7. Describe any five (5) events leading to Jesus' arrest and crucifixion;
8. Enumerate any five (5) theological implications of Jesus' death and resurrection;

Course Contents

The world which Jesus met and worked in. God with Us. Historicity of Jesus Christ. The fullness of Time. Childhood and Youth of Jesus. The Baptism of Jesus. The temptation of Jesus. The Gospel of the kingdom. The Ministry Jesus Christ. The Mission of Jesus Christ. Jesus' Teaching Methods. The Sermon on the Mount. The last days of Christ earthly life. Gethsemane Experience. Jesus' Arrest. Judgement of Jesus. The Crucifixion. Burial and Resurrection. Jesus' Appearances. Theological implications of Jesus Resurrection and teachings.

Minimum Academic Standards

Standard University Library

CHM 101 GENERAL CHEMISTRY I

(2 Units C: LH 30)

Learning Outcomes

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

1. Define atom, molecules and chemical reactions;
2. Discuss the modern electronic theory of atoms;
3. Write electronic configurations of elements on the periodic table;
4. Rationalise the trends of atomic radii, ionisation energies, electronegativity of the elements, based on their position in the periodic table;
5. Identify and balance oxidation–reduction equation and solve redox titration problems;
6. Draw shapes of simple molecules and hybridised orbitals;
7. Identify the characteristics of acids, bases and salts, and solve problems based on their quantitative relationship;
8. Apply the principles of equilibrium to aqueous systems using LeChatelier’s principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures;
9. Analyse and perform calculations with the thermodynamic functions, enthalpy, entropy and free energy; and
10. Determine rates of reactions and its dependence on concentration, time and temperature.

Course Contents

Atoms, molecules, elements and compounds, and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence forces; Structure of solids. Chemical equations and stoichiometry; chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

CHM 102 GENERAL CHEMISTRY II

(2 Units C: LH 30)

Learning Outcomes

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

1. State the importance and development of organic chemistry;
2. Define fullerenes and its applications;
3. Discuss electronic theory;
4. Determine the qualitative and quantitative of structures in organic chemistry;
5. State rules guiding nomenclature and functional group classes of organic chemistry;
6. Determine the rate of reaction to predict mechanisms of reaction;
7. Identify classes of organic functional group with brief description of their chemistry;
8. Discuss comparative chemistry of group 1A, IIA and IVA elements; and
9. Describe basic properties of transition metals.

Course Contents

1. Define and explain set, subset, union, intersection, complements, and demonstrate the use of Venn diagrams;
2. Solve quadratic equations;
3. Solve trigonometric functions;
4. Identify various types of numbers; and
5. Solve some problems using binomial theorem.

Course Contents

Elementary set theory, subsets, union, intersection, complements, 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 of any magnitude, addition and factor formulae.

MTH 102 ELEMENTARY MATHEMATICS II (Calculus) (2 Units C: LH 30)

Learning Outcomes

At the end of the course, students should be able to:

1. Identify the types of rules in differentiation and integration;
2. Recognise and understand the meaning of function of a real variable, graphs, limits and continuity;
3. Solve some applications of definite integrals in areas and volumes;
4. Solve function of a real variable, plot relevant graphs, identify limits and idea of continuity;
5. Identify the derivative as limit of rate of change;
6. Identify techniques of differentiation and perform extreme curve sketching;
7. Identify integration as an inverse of differentiation;
8. Identify methods of integration and definite integrals; and
9. Perform integration application to areas, volumes.

Course Contents

Functions of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation, maxima and minima. Extreme curve sketching, integration, definite integrals, reduction formulae, application to areas, volumes (including approximate integration: Trapezium and Simpson's rule).

MTH 103 ELEMENTARY MATHEMATICS III (Vectors, Geometry and Dynamics) (2 Units C: LH 30)

Learning Outcomes:

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

1. solve some vectors in addition and multiplication.
2. calculate force and momentum.
3. solve differentiation and integration of vectors.
4. analyse kinematics of a particle.

Course Contents

Geometric representation of vectors in 1-3 dimensions, components, direction cosines. Addition, scalar, multiplication of vectors, linear independence. Scalar and vector products of two vectors. Differentiation and integration of vectors with respect to a scalar variable. Two-dimensional co-ordinate geometry. Straight lines, circles, parabola, ellipse, hyperbola. Tangents, normals. Kinematics of a particle. Components of velocity and acceleration of a particle moving in a plane. Force, momentum, laws of

motion under gravity, projectiles and resisted vertical motion. Elastic string and simple pendulum. Impulse, impact of two smooth spheres and a sphere on a smooth surface.

PHY 101 GENERAL PHYSICS I (Mechanics)

(2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Identify and deduce the physical quantities and their units;
2. Differentiate between vectors and scalars;
3. Describe and evaluate motion of systems on the basis of the fundamental laws of mechanics;
4. Apply Newton's laws to describe and solve simple problems of motion;
5. Evaluate work, energy, velocity, momentum, acceleration, and torque of moving or rotating objects;
6. Explain and apply the principles of conservation of energy, linear and angular momentum;
7. Describe the laws governing motion under gravity; and
8. Explain motion under gravity and quantitatively determine behaviour of objects moving under gravity.

Course Contents

Space and time; units and dimension, vectors and scalars, differentiation of vectors: displacement, velocity and acceleration; kinematics; Newton's laws of motion (inertial frames, impulse, force and action at a distance, momentum conservation); relative motion; application of Newtonian mechanics; equations of motion; conservation principles in Physics, conservative forces, conservation of linear momentum, kinetic energy and work, potential energy, system of particles, centre of mass; rotational motion; torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates; conservation of angular momentum; circular motion; moments of inertia, gyroscopes and precession; gravitation: Newton's law of gravitation, Kepler's laws of planetary motion, gravitational potential energy, escape velocity, satellites motion and orbits.

PHY 102 GENERAL PHYSICS II (ELECTRICITY & MAGNETISM) (2 Units C: LH 30)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the electric field and potential and related concepts, for stationary charges;
2. Calculate electrostatic properties of simple charge distribution using Coulomb's law, Gauss's Law and electric potential;
3. Describe and determine the magnetic field for steady and moving charges;
4. Determine the magnetic properties of simple current distributions using Biot-Savart and Ampere's law;
5. Describe electromagnetic induction and related concepts and make calculations using Faraday and Lenz's laws;
6. Explain the basic physical of Maxwell's equations in integral form;
7. Evaluate DC circuits to determine the electrical parameters; and
8. Determine the characteristics of AC voltages and currents in resistors, capacitors and Inductors.

Course Contents

Forces in nature, electrostatics, electric charge and its properties, methods of charging, Coulomb's law and superposition, electric field and potential, Gauss's law, capacitance, electric dipoles, energy in electric fields, conductors and insulators, current, voltage and resistance, Ohm's law and analysis of DC circuits, magnetic fields, Lorentz force, Biot-Savart and Ampère's laws, magnetic dipoles, dielectrics, energy in magnetic fields, electromotive force, electromagnetic induction, self and mutual inductances, Faraday and Lenz's laws, step up and step down transformers. Maxwell's equations, electromagnetic oscillations and waves, AC voltages and currents applied to inductors, capacitors, resistance and combinations.

PHY 103 GENERAL PHYSICS III (BEHAVIOUR OF MATTER) (2 Units C: LH 30)

Learning Outcomes

On completion, the students should be able to:

1. Explain the concepts of heat and temperature and relate the temperature scales;
2. Define, derive and apply the fundamental thermodynamic relations to thermal systems;
3. Describe and explain the first and second laws of thermodynamics, and the concept of entropy;
4. State the assumptions of the kinetic theory and apply techniques of describing macroscopic behaviour;
5. Deduce the formalism of thermodynamics and apply it to simple systems in thermal equilibrium; and
6. Describe and determine the effect of forces and deformation of materials and surfaces.

Course Contents

Heat and temperature, temperature scales; gas laws; general gas equation; thermal conductivity; first Law of thermodynamics; heat, work and internal energy, reversibility; thermodynamic processes; adiabatic, isothermal, isobaric; second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; molecular collisions and mean free path; elasticity; Hooke's law, Young's shear and bulk moduli; hydrostatics; pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 104 GENERAL PHYSICS III (VIBRATION, WAVES AND OPTICS)

(2 Units C: LH 30)

Learning Outcomes

Upon completion of the course, students should be able to:

1. describe and quantitatively analyse the behaviour of vibrating systems and wave energy;
2. explain the propagation and properties of waves in sound and light;
3. identify and apply the wave equations; and
4. explain geometrical optics and principles of optical instruments.

Course Contents

Simple harmonic motion (SHM): energy in a vibrating system, Damped SHM, Q values and power response curves, Forced SHM, resonance and transients, Coupled SHM. Normal modes. Waves: types and properties of waves as applied to sound; Transverse and Longitudinal waves; Superposition, interference, diffraction, dispersion, polarization; Waves at interfaces; Energy and power of waves, the 1-D wave equation, 2-D and 3-D wave equations, wave energy and power, phase and group velocities, echo, beats, the Doppler effect, Propagation of sound in gases, solids and liquids and their properties. Optics: Nature and propagation of light; reflection, refraction, and internal reflection, dispersion, scattering of light,

reflection and refraction at plane and spherical surfaces, thin lenses and optical instruments, wave nature of light; Huygens's principle, interference and diffraction.

PHY 107 GENERAL PRACTICAL PHYSICS I (1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs; and
5. Draw conclusions from numerical and graphical analysis of data.

Course Contents

This introductory course emphasizes quantitative measurements. Experimental techniques. The treatment of measurement errors. Graphical analysis. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc. (covered in PHY 101, 102, 103 and PHY 104). However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis, and deduction.

PHY 108 GENERAL PRACTICAL PHYSICS II (1 Unit C: PH 45)

Learning Outcomes

On completion, the student should be able to:

1. Conduct measurements of some physical quantities;
2. Make observations of events, collect and tabulate data;
3. Identify and evaluate some common experimental errors;
4. Plot and analyse graphs;
5. Draw conclusions from numerical and graphical analysis of data; and
6. Prepare and present practical reports.

Course Contents

This practical course is a continuation of PHY 107 and is intended to be taught during the second semester of the 100 level to cover the practical aspect of the theoretical courses that have been covered with emphasis on quantitative measurements, the treatment of measurement errors, and graphical analysis. However, emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

STA 112 PROBABILITY I (3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the differences between permutation and combination;
2. explain the concept of random variables and relate it to probability and distribution functions;
3. describe the basic distribution functions; and
4. explain the concept exploratory data analysis.

Course Contents

Permutation and combination. Concepts and principles of probability. Random variables. Probability and distribution functions. Basic distributions: Binomial, geometric, Poisson, normal and sampling distributions; exploratory data analysis.

GET 101 ENGINEER IN SOCIETY

(1 Unit C: LH 15)

Learning Outcomes

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

1. Differentiate between science, engineering and technology, and relate them to innovation;
2. Distinguish between the different cadres of engineering – engineers, technologists, technicians and craftsmen and their respective roles and competencies;
3. Identify and distinguish between the relevant professional bodies in engineering;
4. Categorise the goals of global development or sustainable development goals (SDGs); and
5. Identify and evaluate safety and risk in engineering practice.

Course Contents

History, evolution and philosophy of science. engineering and technology. The engineering profession – engineering family (engineers, technologists, technicians and craftsmen), professional bodies and societies. Engineers' code of conduct and ethics, and engineering literacy. Sustainable development goals (SDGs), innovation, infrastructures and nation building - economy, politics, business. Safety and risk analysis in engineering practice. Engineering competency skills – curriculum overview, technical, soft and digital skills. Guest seminars and invited lectures from different engineering professional associations.

GET 102 ENGINEERING GRAPHICS AND MODELLING I (2 Units C: LH 15; PH 45)

Learning Outcomes

1. At the end of this course, the students should be able to:
2. Have a good grasp of design thinking and be obsessed with the determination to apply such to solving simple every day and also complex problems;
3. Recognise the fundamental concepts of engineering drawing and graphics;
4. Show skills to represent the world of engineering objects in actionable solid models, and put such models in a form where they can be inputs for simulation and analyses;
5. Analyse such models for strength and cost;
6. Prepare the objects for modern production and manufacturing techniques of additive and subtractive manufacturing;
7. Recognise that engineering is multidisciplinary in the sense that mechanical, electrical and other parts of physical structures are modelled in context as opposed to the analytical nature of the courses they take; and
8. Analyse and master the basics of mechanical and thermal loads in engineering systems.

Course Contents

Introduction to design thinking and engineering graphics. First and third angle orthogonal projections. Isometric projections; sectioning, conventional practices, conic sections and development. Freehand and guided sketching – pictorial and orthographic. Visualization and solid modelling in design, prototyping and product-making. User interfaces in concrete terms. Design, drawing, animation, rendering and simulation workspaces. Sketching of 3D objects. Viewports and sectioning to shop drawings in orthographic projections and perspectives. Automated viewports. Sheet metal and surface modelling.

Material selection and rendering. This course will use latest professional design tools such as fusion 360, solid works, solid edge or equivalent.

MEE 101 INTRODUCTION TO MECHANICAL ENGINEERING (2 Units C: LH 30)

Learning Outcomes:

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

1. Differentiate between science, engineering and technology, and relate them to innovation;
2. Identify the various branches of mechanical engineering discipline and their applications to the solution of societal problems;
3. Demonstrate appreciation of the problem of climate change; and
4. Demonstrate appreciation of the role of energy systems to environmental sustainability.

Course Contents

Historical development of the mechanical engineering discipline. Philosophy and scope of contemporary mechanical engineering course programme. Overview of mechanical engineering special fields: applied (solid) mechanics, fluid and thermal engineering (thermodynamics and heat transfer). Industrial/production engineering and engineering management sciences. The linkage between mechanical engineering and other engineering disciplines and the sciences. The concept of innovation. Illustrations of a wide variety applications of mechanical engineering. The role of mechanical engineers in the society and human development. Professional ethical responsibility. Climate change, renewable energy and environmental sustainability.

BU-MEE 102 WORKSHOP PRACTICE IN MECHANICAL ENGINEERING (2 Units C: PH 90)

Learning Outcomes

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

1. Explain the concept of safety in all ramifications as the basic engineering character so that, it becomes the first thing that comes to mind in every step to be made.
2. Explain and apply the character and power of “observation”
3. Explain and apply the process of handling tools, equipment and materials.
4. Apply the skills of cutting materials to correct measurement without error.
5. Explain and apply the proves involved in securing work pieces or materials firmly on the vice or clamp before working on it
6. Demonstrate the importance of using the correct tools for every job always.
7. Explain the importance of operating only the machines that have been inducted or permitted to use.
8. Apply the processes in each of the available engineering workshops to predetermined projects.

Course Content

Part 1: Detailed analysis of safety systems in engineering practices. Detailed analysis of safety in different workshops fitting/machining shop and welding shop. General impartation on the use of measuring tools like metric rules and micrometer screw gauge etc. Introduction to the use of simple hand tools in the fitting shop like cutting tools and clamps/holding etc in individual projects. Introduction to the use of hand tools in the wood shop like fastening tools and surface finish tools etc with individual work piece. Introduction

to the use of oxy-acetylene welding equipment using a personal work piece. Introduction of the machines found in machine shop.

Part 2: Detailed introductions on the general characteristic and use of power tools/machines and safety implications. Detailed sketches of various machines and accurate labeling of parts. General inductions on the use of machines for various jobs in the workshop. Specific project on the use of power saw and lathe machine using a work piece. Specific project on the use of power saw and different levels of surface finish in the fitting shop using a work piece. Specific project on the use of power saw and shaping machine using a work piece. Specific project on the use of power saw and milling machine using a work piece. Specific projects on the use of electric arc welding machine using a work piece. Specific project on the use of wood machines like milling, lathe etc.) using a work piece. Review of work piece and correction of defects prior to submission.

ENT 211 ENTREPRENEURSHIP AND INNOVATION (2 Units C: LH 30)

Learning Outcomes

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

1. Explain the concepts and theories of entrepreneurship, intrapreneurship, opportunity seeking, new value creation and risk-taking;
2. State the characteristics of an entrepreneur;
3. Analyse the importance of micro and small businesses in wealth creation, employment generation and financial independence;
4. Engage in entrepreneurial thinking;
5. Identify key elements in innovation;
6. Describe the stages in enterprise formation, partnership and networking, including business planning;
7. Describe contemporary entrepreneurial issues in Nigeria, Africa and the rest of the world; and
8. State the basic principles of e-commerce.

Course Contents

The concept of entrepreneurship (entrepreneurship, intrapreneurship/corporate entrepreneurship); theories, rationale and relevance of entrepreneurship (Schumpeterian and other perspectives, risk-taking, necessity and opportunity-based entrepreneurship, and creative destruction); characteristics of entrepreneurs (opportunity seeker, risk-taker, natural and nurtured, problem solver and change agent, innovator and creative thinker); entrepreneurial thinking (critical thinking, reflective thinking and creative thinking).

Innovation (The concept of innovation, dimensions of innovation, change and innovation, knowledge and innovation). Enterprise formation, partnership and networking (basics of business plan, forms of business ownership, business registration and alliance formation, and joint ventures). Contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office and networking). Entrepreneurship in Nigeria (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

GST 212 PHILOSOPHY, LOGIC AND HUMAN EXISTENCE (2 Units C: LH 30)

Learning Outcomes

At the end of the course, students should be able to:

1. Know the basic features of philosophy as an academic discipline;
2. Identify the main branches of philosophy & the centrality of logic in philosophical discourse;

3. Know the elementary rules of reasoning;
4. Distinguish between valid and invalid arguments;
5. Think critically and assess arguments in texts, conversations and day-to-day discussions;
6. Critically assess the rationality or otherwise of human conduct under different existential conditions;
7. Develop the capacity to extrapolate and deploy expertise in logic to other areas of knowledge, and
8. Guide his or her actions, using the knowledge and expertise acquired in philosophy and logic.

Course Contents

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character molding.

BU – GST 200 COMMUNICATION IN FRENCH

(1 Units: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Abilities to greet
2. Knowing how to express time.
3. Knowledge of counting up 1000
4. Conjugaison of Etre and Avoir and be able to form sentences with the auxiliaries
5. Use pronoun instead of names
6. Make sentences in present tense with the verbs
7. Presentation of oneself in French Language.
8. Essay witing.

Course Contents

Alphabet. Salutation. L'heure. Le nombre. Le pronom personnel et l'auxiliaire Avoir et Être Les trois groupe verbes au présent de l'indicatif (premier groupe verbe, Deuxième groupe verbe, Troisième groupe verbe) Adjective possessive, Adjective Démonstratif etc et présentation

BU – GST 215 ADVENTIST HERITAGE

(3 Units: C: LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Explain the history of the Seventh-day Adventist Church.
2. Illustrate the systematic development of the Seventh-day Adventist Church.
3. State the contributions of at least five (5) pioneers of the Seventh-day Adventist Church.
4. Explain the seven (7) pillars of the Seventh-day Adventist church doctrine.
5. Describe the Seventh-day Adventists' concepts of holistic education, health reforms, and publishing ministries.
6. Identify at least eight (8) major contributions of Adventist education, health reforms, and publishing ministries.

7. Enumerate at least (7) areas in which the prophetic gift has shaped the mission of the Seventh-day Adventist Church.
8. Explain the meaning of Adventism and the aim of Adventist mission.
9. Describe the dynamics involved in the origin and growth of Seventh-day Adventism in Africa.
10. List at least eight (8) major contributions of the Seventh-day Adventism in Africa, with specific focus on national growth and development.

Course Contents

The historical and prophetic origin of the Seventh-day Adventist Church. Millerite roots, before 1844. The 1844 experiences. The development and organization of the Seventh-day Adventist Church. The era of doctrinal and organizational development (1844 – 1863). The era of institutional and lifestyle development (1863ff). The era of revival, reform, and expansion (1888 – 1900). The era of reorganization and Crisis (1901 - 1910). The era of worldwide growth (1910 – 1955). The challenges and possibilities of maturity (1955). The contributions of the pioneers and founders of the Seventh-day Adventist Church. The Pillars of Adventism. Adventists' concepts of holistic education. Healthcare and reforms. Publishing ministries. The prophetic gift in the Seventh-day Adventist Church. Significance of prophetic gift to the Adventist Mission. The purpose of Adventism. Adventist concept of mission. The origin, exploits and challenges of Seventh-day Adventism in Africa. Contributions of the Seventh-day Adventism in Africa.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts.

BU – GST 220 ORIGIN OF SCIENCE

(1 Unit: C: LH 15)

Learning Outcomes:

On completion of the course, the students should be able to:

1. Outline the major steps of the scientific method and its limitations.
2. Describe three (3) scientific theories on the origin of life and their major challenges.
3. State two (2) characteristics of a molecular structure that posed challenges to evolution.
4. Identify one (1) strength and drawback of the geologic column and fossil record to the evolutionary concept.
5. State two (2) evidences in nature and archeology that support Biblical creation account.
6. List three (3) faith-believing and non-faith scientists and their major contributions to science.
7. List two (2) alternative theories to evolution and their evidence.
8. Discuss the harmony between science and religion.

Course Contents

Religion and Science. Origin, Creation and the Flood. Scientific theories about the Origin of Life. Darwinism and theory of Evolution. Micro- and Macro-evolution. Geologic column, Fossil record. Aspects of Human origin. Drawback to the theory of evolution and Darwinism. Cambrian explosion. Incompleteness of the Fossil record. Origin of the Universe and the Total Environment. The Big bang theory. Scientific dating and drawback. Alternative theories of Origin. Intelligent Design (ID). Molecular machines and Irreducible Complexity (IC). Specificity and regulation of the DNA. Fine tuning of the Universe. Uniqueness of the Planet Earth and Life. The Flood. The Scientific method and Limitations of Science. Science, Reasoning and Faith.

Minimum Academic Standards

None.

BU – GST 221 INTRODUCTION TO AGRICULTURE

(1 Unit: C: LH 15; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Recall the definition and discuss at least three (3) of the branches of agriculture.
2. Critique five important agricultural policies in Nigeria.
3. Discuss the objectives of Soil Science.
4. Discuss 5 physical properties of soil.
5. Discuss the characteristics of different soil types.
6. Discuss the reasons for losses of agricultural soil
7. Discuss different types of agricultural systems and practices with relevant examples in Nigeria
8. Describe the different types of crops with examples from across Nigeria
9. Discuss the problems facing livestock producers across Nigeria
10. Describe 3 common management practices in poultry/livestock production.

Course Contents

Introduction to Agriculture, its origin, branches and importance; Definition, scope and objectives & review of Agricultural policies; Introduction to soil science, its aims and objectives; Soil formation and soil physical properties; Erosion; Introduction to Crop Science (Agricultural systems/practices); Livestock production (importance & problems of livestock industry); Production practices of some selected ruminants, monogastric & non-ruminant herbivores; Non-conventional livestock production practices

Minimum Academic Standards

Field experimental plots

BU – GST 290 INTRODUCTION TO DATA ANALYTICS

(1 Unit: C: LH 15; PH 45)

Learning Outcome

On completion of the course. Students should be able to do:

1. uncertainty analysis
2. data fitting
3. feed-forward neural networks
4. probability density functions
5. correlation functions
6. fourier analysis and FFT procedures
7. spectral analysis
8. digital filtering
9. hilbert transforms.

Course Content

Connecting to data. Simplifying and sorting data. Organizing data. Posing a question. Wrangling data into a format. fixing data problems. exploring the data. finding patterns. building intuition. comparing measures. Statistics and forecasting. Dashboards and stories.

Lab Work: Students will undertake the following tasks in the practical classes; learn how to analyze data to understand data through natural language queries that allows to ask questions about data without having

to write complicated formulas. In addition, students will learn how to analyze data to provide high-level visual summaries, trends, and patterns.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement.

GET 201 APPLIED ELECTRICITY

(3 Units C: LH 30; PH 45)

Learning Outcomes

Students will be able to:

1. Discuss the fundamental concepts of electricity and electrical d.c. Circuits;
2. State, explain and apply the basic d.c. circuit theorems;
3. Explain the basic a.c. circuit theory and
4. Apply to solution of simple circuits.

Course contents

Fundamental concepts: Electric fields, charges, magnetic fields. current, B-H curves Kirchhoff's laws, superposition. Thevenin, Norton theorems, Reciprocity, RL, RC, RLC circuits. DC, AC bridges, Resistance, Capacitance, Inductance measurement, Transducers, Single phase circuits, Complex j - notation, AC circuits, impedance, admittance, susceptance.

GET 202 ENGINEERING MATERIALS

(3 Units C: LH 45)

Learning Outcomes

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

1. Demonstrate the role of atoms and molecules (aggregates of atoms) in the building of solid/condensed matter known as engineering materials, the electrons quantum numbers and how the electrons are arranged in different atomic elements, and explain the role of electronic configuration and valence electrons in bonding;
2. Define metals, alloys and metalloids, demonstrate mental picture of the solid mineral resources development as a relay race among four 'athletes': geologist, mining engineer, mineral processing technologist, process metallurgical engineer, and classify metallurgical engineering into 3Ps: process, physical and production;
3. Explain the relationship between structure and properties of materials, characteristics, components and compositions of phase diagrams and phase transformations of solid solutions;
4. Define ceramics, glass and constituents of glasses and understand application of ceramics in mining, building, art and craft industries;
5. Define and classify polymers as a class of engineering materials and polymeric materials, demonstrate polymerisation reactions, their types and mechanism, and applications of polymers;
6. Define properties, types and application of composite materials and fibres (synthetic and natural);
7. Define and classify nanomaterials, demonstrate applications of nanomaterials, concept, design and classification of fracture mechanics, corrosion classification, including the five principal ways of controlling corrosion and metal finishing processes such as sherardising, galvanising and anodising; and
8. Identify factors affecting the performance and service life of engineering materials/metals and metallography of metals/materials (materials anatomy), which enables metallurgical and materials engineers to prescribe appropriate solutions to test metals/materials fitness in service through structure-property-application relationships.

Course Contents

Basic material science; atomic structure, atomic bonding and crystal structures. Engineering materials situating metals and alloys; metals and alloys, classifications of metals, metal extraction processes using iron and steel (ferrous) and aluminium (nonferrous) as examples, phase diagrams/iron carbon diagrams, and mechanical workings of metals. Selection and applications of metals and alloys for specific applications in oil, aerospace, construction, manufacturing and transportation industries, among others. Ceramics (including glass); definition, properties, structure and classifications of ceramics. Bioactive and glass – ceramics. Toughening mechanism for ceramics. Polymers; definition of polymers as engineering materials, chemistry of polymeric materials, polymer crystallisation, polymer degradation and aging. Thermoplastic and thermosetting polymers and concepts of copolymers and homopolymers. Composites; definition, classification, characterisation, properties and composite. Applications of composites. Nanomaterials; definition, classification and applications of nanomaterials as emerging technology. Processing of nanomaterials including mechanical grinding, wet chemical synthesis, gas phase synthesis, sputtered plasma processing, microwave plasma processing and laser ablation. Integrity assessment of engineering materials; effect of engineering design, engineering materials processing, selection, manufacturing and assembling on the performance and service life of engineering materials. Metallography and fractography of materials. Mechanical testing (destructive testing) of materials such as compressive test, tensile test, hardness test, impact test, endurance limit and fatigue test. Non-destructive test (NDT) such as dye penetrant, x-ray and eddy current.

GET 203 ENGINEERING GRAPHICS AND SOLID MODELING II (2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Apply mastery of the use of projections to prepare detailed working drawing of objects and designs;
2. Identify skills in parametric design to aid their ability to see design in the optimal specification of materials and systems to meet needs;
3. Be able to analyze and optimize designs on the basis of strength and material minimization;
4. Get their appetites wetted in seeing the need for the theoretical perspectives that create the basis for the analysis that are possible in design and optimization, and recognize/understand the practical link to excite their creativity and ability to innovate; and
5. Be able to translate their thoughts and excitements to produce shop drawings for multiphysical, multidisciplinary design.

Course Contents

Projection of lines, auxiliary views and mixed projection. Preparation of detailed working production drawing; semi-detailed drawings, conventional presentation methods. Solid, surface and shell modeling. Faces, bodies and surface intersections. Component-based design. Component assembly and motion constraints. Constrained motions and animation. Introduction to electronics modeling. Electronics board layout preparation, Component libraries and Schematic design. Parametric modeling and adaptive design. Simulation for material optimization. Designing for manufacturing. Additive and subtractive manufacturing. Production for 3-D printing, Laser cutting and CNC machinery. Arrangement of engineering components to form a working plant (Assembly Drawing of a Plant).

GET 204 STUDENT WORKSHOP PRACTICE (2 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Identify various basic hands and machine tools, analogue and digital measurement devices and instruments, and acquire skills in their effective use and maintenance;
2. Explain the various forms of Measurements such as Straightness Measurements, Flatness Measurement, Roundness Measurements and Surface Finishing Measurements.
3. Describe Tolerances and quality, Fits, Clearance, transition and interference fits.
4. Explain the basic principles in Super micro-metry and Comparator-Profilometry
5. Practically apply basic engineering technologies, including metrology, casting, metal forming and joining, materials removal, machine tooling (classification, cutting tool action, cutting forces, non-cutting production) and CNC machining technology;
6. Master workshop and industrial safety practices, accident prevention and ergonomics;
7. Physically recognise different electrical & electronic components like resistances, inductances, capacitances, diodes, transistors and their ratings;
8. Connect electric circuits, understand different wiring schemes, and check ratings of common household electrical appliances and their basic maintenance; and
9. Determine household and industrial energy consumption, and understand practical energy conservation measures.
10. Apply the basic principles of Collimators in Machine Installations.

Course Contents

The course comprises general, mechanical and electrical components: supervised hands-on experience in safe usage of tools and machines for selected tasks;

Metrology: Theory and practice of high precision. Forms of Measurements. Straightness Measurements. Flatness Measurement. Roundness Measurements. Surface Finishing Measurements. Mechanical measurements under strict control conditions. Measurements of Engineering Properties. Linear and Angular Measurements. Super micro-metry, Comparator-Profilometry, Collimators. Application in Machine Installations. Tolerances and quality. Limits and Fits - Transition and interference fits. Clearance. Measurement of Engineering Properties. Use of measuring instruments (calipers, micrometers, gauges, sine bar, wood planners, saws, sanders, and pattern making).

Machine shop: lathe work shaping, milling, grinding, reaming, metal spinning. Hand tools, gas and arc welding, cutting, brazing and soldering. Foundry practice. Industrial safety and accident prevention, ergonomics. Casting processes. Metal forming processes: hot-working and cold-working processes (forging, press-tool work, spinning, etc.). Metal joining processes (welding, brazing and soldering). Heat treatment. Material removal processes. machine tools and classification. Simple theory of metal cutting. Tool action and cutting forces. Introduction to CNC machines.

Supervised identification, use and care of various electrical and electronic components such as resistors, inductors, capacitors, diodes and transistors. Exposure to different electric circuits, wiring schemes, analogue and digital electrical and electronic measurements. Household and industrial energy consumption measurements. Practical energy conservation principles.

GET 205 FUNDAMENTALS OF FLUID MECHANICS (3 Units C: LH 45)

Learning Outcomes

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

1. Explain the properties of fluids;
2. Determine forces in static fluids and fluids in motion;
3. Determine whether a floating body will be stable;

4. Determine the effect of various pipe fittings (valves, orifices, bends and elbows) on fluid flow in pipes;
5. Measure flow parameters with venturi meters, orifice meters, weirs;
6. Perform calculations based on principles of mass, momentum and energy conservation;
7. Perform dimensional analysis and simple fluid modelling problems; and
8. Specify the type and capacity of pumps and turbines for engineering applications.

Course Contents

Fluid properties, hydrostatics, fluid dynamics using principles of mass, momentum and energy conservation from a control volume approach. Flow measurements in pipes, dimensional analysis, and similitude, 2-dimensional flows. Hydropower systems.

GET 206 FUNDAMENTALS OF ENGINEERING THERMODYNAMICS (3 Units C: LH 45)

Learning Outcomes

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

1. Describe basic concepts of thermodynamics, quantitative relations of Zeroth, first, second and third laws;
2. Define and explain system, surrounding, closed and open system, control volume and control mass, extensive and intensive properties;
3. Calculate absolute and gage pressure, and absolute temperature, calculate changes in kinetic, potential, enthalpy and internal energy;
4. Evaluate the properties of pure substances i.e. Evaluate the state of the pure substances such as compressed liquid, saturated liquid-vapour mixture and superheated vapour using property diagrams and tables; arrange the ideal and real gas equations of state,
5. Formulate the first law of thermodynamics for a closed system i.e. Organize the change in energy in the closed systems via heat and work transfer;
6. Distinguish heat transfer by conduction, convection and radiation, and calculate the amount of heat energy transferred;
7. Calculate the changes in moving boundary work, spring work, electrical work and shaft work in closed systems;
8. Apply the first law of thermodynamics for closed systems and construct conservation of mass and energy equations;
9. Formulate the first law of thermodynamics to the open systems i.e. Describe steady-flow open system, apply the first law of thermodynamics to the nozzles, diffusers, turbines, compressors, throttling valves, mixing chambers, heat exchangers, pipe and duct flow;
10. Construct energy and mass balance for unsteady-flow processes;
11. Evaluate thermodynamic applications using second law of thermodynamics;
12. Calculate thermal efficiency and coefficient of performance for heat engine, refrigerators and heat pumps; and
13. Restate perpetual-motion machines, reversible and irreversible processes.

Course Contents

Basic concepts, definitions and laws (quantitative relations of Zeroth, first, second and third laws of thermodynamics). Properties of pure substances: the two-property rule (P-v-T behaviour of pure substances and perfect gases); state diagrams. The principle of corresponding state; compressibility

relations; reduced pressure; reduced volume; temperature; pseudo-critical constants. The ideal gas: specific heat, polytropic processes. Ideal gas cycles; Carnot; thermodynamic cycles, turbines, steam and gas, refrigeration. The first law of thermodynamics – heat and work, applications to open and closed systems. The steady flow energy equation (Bernoulli's equation) and application. Second law of thermodynamics, heat cycles and efficiencies.

GET 207 APPLIED MECHANICS

(3 Units C: LH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

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

Course Contents

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

GET 208 STRENGTH OF MATERIALS

(3 Units C: LH 45)

Learning Outcomes

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

1. Recognise a structural system that is stable and in equilibrium;
2. Determine the stress-strain relation for single and composite members based on Hooke's law;
3. Estimate the stresses and strains in single and composite members due to temperature changes;
4. Evaluate the distribution of shear forces and bending moments in beams with distributed and concentrated loads;
5. Determine bending stresses and their use in identifying slopes and deflections in beams;
6. Use Mohr's circle to evaluate the normal and shear stresses in a multi-dimensional stress system and transformation of these stresses into strains;
7. Evaluate the stresses and strains due to torsion on circular members; and
8. Determine the buckling loads of columns under various fixity conditions at the ends.

Course Contents

Consideration of equilibrium in composite members. Stress-strain relation. Axial load and statically indeterminate axially loaded members. Generalized Hooke's law. Stresses and strains due to loading and temperature changes. Thermal stress. Torsion of circular members. Angle of twist. Statically indeterminate torque-loaded members. Shear force and bending moments. Bending stresses in beams with symmetrical loading. Bending stresses in beams with combined loadings. Transverse shear. Eccentric axial loading of beams. Stress and strain transformation equations. Mohr's circle. Elastic buckling of columns.

GET 209 ENGINEERING MATHEMATICS I**(3 Units C: LH 45)****Learning Outcomes**

At the end of the course, the students should be able to:

1. Solve qualitative problems based on vector and matrix analyses such as linear independence and dependence of vectors, rank etc;
2. Describe the concepts of limit theory and nth order differential equations and their applications to physical phenomena;
3. Solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables;
4. Describe the applications of double and triple integration in finding the area and volume of engineering solids, and explain the qualitative applications of Gauss, Stoke's and Green's theorem;
5. Explain ordinary differential equations and applications, and develop a mathematical model of linear differential equations, as well as appreciate the necessary and sufficient conditions for total differential equations; and
6. Analyse basic engineering models through partial differential equations such as wave equation, heat conduction equation, etc., as well as fourier series, initial conditions and its applications to different engineering processes

Course Contents

Limits, continuity, differentiation, introduction to linear first order differential equations, partial and total derivatives, composite functions, matrices and determinants, vector algebra, vector calculus, directional derivatives.

GET 210 ENGINEERING MATHEMATICS II**(3 Units C: LH 45)****Learning Outcomes**

At the end of the course, the students should be able to:

1. Describe physical systems using ordinary differential equations (odes);
2. Explain the practical importance of solving odes, solution methods, and analytically solve a wide range of odes, including linear constant coefficient types;
3. Numerically solve differential equations using MATLAB and other emerging applications;
4. Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion, as well as on functions of several variables, including directional derivatives and multiple integrals;
5. Solve problems using the fundamental theorem of line integrals, Green's theorem, the divergence theorem, and Stokes' theorem, and perform operations with complex numbers;
6. Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions of complex variables, as well as the theory of conformal mapping to solve problems from various fields of engineering; and
7. Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula.

Course Contents

Introduction to ordinary differential equations (ODEs); theory, applications, methods of solution; second order differential equations. Advanced topics in calculus (vectors and vector-valued function, line integral, multiple integral and their applications). Elementary complex analysis including functions of complex variables, limits and continuity. Derivatives, differentiation rules and differentiation of integrals. Cauchy-Riemann equation, harmonic functions, basic theory of conformal mapping, transformation and mapping and its applications to engineering problems. Special functions.

GET 211 COMPUTING AND SOFTWARE ENGINEERING (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems;
2. Develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from python, java or C++;
3. Use widely available libraries to prepare them for machine learning, graphics and design simulations;
4. Develop skills in eliciting user needs and designing an effective software solution;
5. Recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services; and
6. Acquire capabilities that can further be developed to make them productively employable by means of short internet courses in specific areas;

Course Contents

Introduction to computers and computing; computer organization – data processing, memory, registers and addressing schemes; Boolean algebra; floating-point arithmetic; representation of non-numeric information; problem-solving and algorithm development; coding (solution design using flowcharts and pseudo codes). Data models and data structures; computer software and operating system; computer operators and operators precedence; components of computer programs; introduction to object oriented, structured and visual programming; use of MATLAB in engineering applications. ICT fundamentals, Internet of Things (IoT). Elements of software engineering.

GET 290 STUDENT INDUSTRIAL WORK EXPERIENCE I (3 Units C: 9 weeks)

Learning Outcomes

SIWES I should provide opportunity for the students to:

1. Acquire industrial workplace perceptions, ethics, health and safety consciousness, inter-personal skills and technical capabilities needed to give them a sound engineering foundation;
2. Learn and practise 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.

Course Contents

Practical experience in a workshop or industrial production facility, construction site or special centers in the university environment, considered suitable for relevant practical/industrial working experience but not necessarily limited to the student's major. The students are exposed to hands-on activities on workshop safety and ethics, maintenance of tools, equipment and machines, welding, fabrication and foundry equipment, production of simple devices; electrical circuits, wiring and installation. (8-10 weeks during the long vacation following 200 level).

ENT 312 VENTURE CREATION

(2 Units C: LH 15; PH 45)

Learning Outcomes

At the end of this course, students, through case study and practical approaches, should be able to:

1. Describe the key steps in venture creation;
2. Spot opportunities in problems and in high potential sectors, regardless of geographical location;
3. State how original products, ideas and concepts are developed;
4. Develop a business concept for further incubation or pitching for funding;
5. Identify key sources of entrepreneurial finance;
6. Implement the requirements for establishing and managing micro and small enterprises;
7. Conduct entrepreneurial marketing and e-commerce;
8. Apply a wide variety of emerging technological solutions to entrepreneurship; and
9. Appreciate why ventures fail due to lack of planning and poor implementation.

Course Contents

Opportunity identification (sources of business opportunities in Nigeria, environmental scanning, demand and supply gap/unmet needs/market gaps/market research, unutilized resources, social and climate conditions and technology adoption gap). New business development (business planning, market research). Entrepreneurial finance (venture capital, equity finance, micro-finance, personal savings, small business investment organizations and business plan competition). Entrepreneurial marketing and e-commerce (principles of marketing, customer acquisition & retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E-commerce business models and successful e-commerce companies). Small business management/family business: Leadership & Management, basic book keeping, nature of family business and family business growth model. Negotiation and business communication (strategy and tactics of negotiation/bargaining, traditional and modern business communication methods). Opportunity discovery demonstrations (business idea generation presentations, business idea contest, brainstorming sessions, idea pitching). Technological solutions (The concept of market/customer solution, customer solution and emerging technologies, business applications of new technologies - artificial intelligence (AI), virtual/mixed reality (VR), Internet of things (IoTs), blockchain, cloud computing, renewable energy, etc. Digital business and e-commerce strategies).

GST 312 PEACE AND CONFLICT RESOLUTION

(2 Units C: LH 30)

Learning Outcomes

At the end of this Course, students should be able to:

1. Analyse the concepts of peace, conflict and security;
2. List major forms, types and root causes of conflict and violence;
3. Differentiate between conflict and terrorism;
4. Enumerate security and peace building strategies; and

5. Describe the roles of international organisations, media and traditional institutions in peace building.

Course Contents

The concepts of peace, conflict and security in a multi-ethnic nation. Types and theories of conflicts: ethnic, religious, economic, geo-political Conflicts; structural conflict theory, realist theory of conflict, frustration-aggression conflict theory; root causes of conflict and violence in Africa: indigene and settlers phenomenon, boundaries/boarder disputes, political disputes, ethnic disputes and rivalries, economic inequalities, social disputes, nationalist movements and agitations; selected conflict case studies – Tiv-Junkun, ZangoKartaf, chieftaincy and land disputes, etc. Peace building, management of conflicts and security: Peace & Human Development. Approaches to Peace & Conflict Management (religious, government, community leaders, etc.). Elements of peace studies and conflict resolution: Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and terrorism. Peace mediation and peace keeping. Peace and Security Council (international, national and local levels). Agents of conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution (ADR) (dialogue, arbitration, negotiation, collaboration, etc). The roles of international organizations in conflict resolution ((a) The United Nations, UN and its conflict resolution organs. (b) The African Union & Peace Security Council (c) ECOWAS in peace keeping). The media and traditional institutions in peace building. Managing post-conflict situations/crises: Refugees. Internally Displaced Persons (IDPs); the role of NGOs in post-conflict situations/crises.

BU – GST 310 DATA ANALYSIS USING ADVANCED EXCEL / SPSS / POWER BI / TABLEAU (1 Units C: LH 45, PH 45)

Learning Outcome

At the end of the course. the students should be able to:

- i. use pivot tables and pivot charts
- ii. use conditional formatting
- iii. remove duplicates
- iv. use XLOOKUP
- v. prepare datasets for use in Power BI Desktop or Power BI Service
- vi. ii. learn to manage big data prep using systems like Power Query
- vii. iii. create visualizations within a Power BI Dashboard
- viii. read-in, enter, organize, and save data in a suitable way.
- ix. calculate/recode variables and prepare data for analysis.
- x. conduct descriptive and basic inferential statistics.
- xi. be familiar with SPSS presentation of statistical output.
- xii. create and edit graphical displays of data.

Course Content

Connecting to data. Simplifying and sorting data. Organizing data. Slicing data by date. Using multiple measures in a view. Showing the relationship between numerical values. Mapping data geographically. Get Started with Microsoft Data Analytics. Prepare Data in Power BI. Clean. Transform. Load Data in Power BI. Design a Data Model in Power BI. Create Measures using DAX in Power BI. Introduction to Tableau - Introduction. Visual Analysis. Visual Perception. Tableau Product Family. Connecting to Data. Data Terminology. Getting Dirty with Your Data-Introduction. Introduction to IBM SPSS Statistics.

BU – GST 317 FUNDAMENTALS OF CHRISTIAN FAITH (3 Units C: LH 45)

Learning outcomes

On completion of the course, students should be able to:

1. Assess the history and development of the Old Testament and the New Testament Scripture;
2. Enumerate at least five (5) attributes of God;
3. Identify any seven (7) characteristic features of the Holy Spirit;
4. Assess any five (5) interconnectedness between the Law and grace;
5. Enumerate at least five (5) evidences of the biblical Sabbath;
6. Identify the symbolism and interpretation of the Daniel 2.
7. Assess at least four (4) signs of Christ's Second Coming;
8. Explain at least three (3) of the biblical ordinances in the scriptures
9. Describe any three (3) of the Christian lifestyles

Course Contents

Nature of Inspiration. God's Word. Authenticity of the Bible. Theology of God: His Names & Attributes. The Holy Spirit. Creation. Origin of Sin. Fall of Man. The Flood. Jesus' Incarnation and Ministry of Intercession. Law and Grace. The Sabbath. The Church and its Mission. Prophecy of Daniel 2. Second Coming. The Signs of the Second Coming. Manner of Jesus' Second Coming. Millennium and the New Earth. Biblical Ordinances. Christian Lifestyles. Prophetic Gift and the Church.

Minimum Academic Standards

Standard Modern library.

GET 301 ENGINEERING MATHEMATICS III (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Demonstrate a clear understanding of the course content, that is, possess a breadth of knowledge in the area covered;
2. Possess an in-depth knowledge upon which a solid foundation can be built in order to demonstrate a depth of understanding in advanced mathematical topics;
3. Develop simple algorithms and use computational proficiency;
4. Write simple proofs for theorems and their applications; and
5. Communicate the acquired mathematical knowledge effectively in speech, writing and collaborative groups.

Course Contents

Linear Algebra. Tensor algebra and analysis, Elements of Matrices, Determinants, Inverses of Matrices, bases representation of tensors. The Euclidean point space and vector spaces. Theory of Linear Equations. Eigen Values and Eigen Vectors. Analytical Geometry. Basic transformations: identity, spherical, Projection and Coordinate Transformation as tensors, Traces, Determinants and other scalar invariants. Equivalent stresses and strains as examples of scalar invariant. Applications to design, analyses and optimization. Elgenvalues, Elgeanvectors of tensors. Solid Geometry. Polar, cylindrical and spherical

structure Fog Index concept. Skills for communication and communication algorithm. Types and goals of communication; Interpersonal communication; features and the Finger Model or A,B,C,D,E of good interpersonal communication (accuracy of technical terms, brevity of expression, clarity of purpose, directness of focus and effectiveness of the report). Language and organization of reports. Technical report writing skills(steps, problems in writing, distinguishing technical and other reports, significance, format and styles of writing technical reports). Different formats for communication; styles of correspondences – business report and proposal, business letter, memorandum, e-mails, etc. Proposals for projects and research; format, major steps and tips of grant-oriented proposals. Research reports (competency, major steps, components and formats of research reports and publishable communication). Sources and handling of data, tables, figures, equations and references in a report. Presentation skills; overview, tips, organization, use of visual aids and practising of presentation. Intellectual property rights in research reports. Case studies of major engineering designs, proposals and industrial failures with professional presentation of reports.

GET 305 ENGINEERING STATISTICS AND DATA ANALYTICS (3 Units C: LH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Work with data from the point of view of knowledge convergence, machine learning, and intelligence augmentation, which significantly raises their standard for engineering analysis (the approach forces them to learn statistics in an actionable way that helps them to see the holistic importance of data analytics in modern engineering and technology);
2. Anticipate the future with artificial intelligence while fulfilling the basic requirements of conventional engineering statistical programming consistent with their future careers;
3. Perform, with proficiency, statistical inference tasks with language or programming toolboxes such as r, python, mathematica or matlab, and design expert to summarise, analysis and interpretation of industry engineering data, and make appropriate conclusions based on such experimental and/or real-life industrial data;
4. Construct appropriate graphical displays of data and highlight the roles of such displays in data analysis, particularly the use of statistical software packages;
5. Plan and execute experimental programmes to determine the performance of programme-relevant industrial engineering systems, and evaluate the accuracy of the measurements undertaken; and
6. Demonstrate mastery of data analytics and statistical concepts by communicating the results of experimental and industry-case investigations, critically reasoned scientific and professional analysis through written and oral presentation.

Course Contents

Descriptive statistics, frequency distribution, populations and sample, central tendency, variance data sampling, mean, median, mode, mean deviation, percentiles, etc. Probability. Binomial, poisson hyper-geometric, normal distributions, etc. Statistical inference intervals, test hypothesis and significance. Regression and correlation. Research Methodology. Introduction to big data analytics and cloud computing applications. Introduction to the R language; R as a calculator; Vectors, matrices, factors, data frames and other R collections. Iteration and looping control structures. Conditionals and other controls. Designing, using and extending functions. The Apply Family. Statistical modelling and inference in R.

GET 306 RENEWABLE ENERGY SYSTEM AND TECHNOLOGY (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of the course, the students should be able to:

1. Identify the types, uses and advantages of renewable energy in relation to climate change;
2. Design for use the various renewable energy systems;
3. Recognise and analyse the current energy systems in Nigeria, their impacts on development and the global energy demand and supply scenarios;
4. Appreciate the environmental impact of energy exploitation and utilisation, and pursue the sustainable development of renewable energy for various applications; and
5. Recognise the exploitation, excavation, production, and processing of fossil fuels such as coal, petroleum and natural gas, and discuss the sources, technology and contribution to future energy demands of renewable energy.

Course Contents

Current and potential future energy systems in Nigeria and globally - resources, extraction, concepts in energy conversion systems; parallels and differences in various conversion systems and end-use technologies, with emphasis on meeting 21st-century national, regional and global energy needs in a sustainable manner. Various energy technologies in each fuel cycle stage for fossil (oil, gas, synthetic), nuclear (fission and fusion) and renewable (solar, biomass, wind, hydro, and geothermal). Energy types, storage, transmission and conservation. Analysis of energy mixes within an engineering, economic and social context. Sustainable energy; emphasise sustainability in general and in the overall concept of sustainable development and the link this has with sustainable energy as the fundamental benefit of renewable energy.

Practical Contents

Simple measurement of solar radiation, bomb calorimeter determination of calorific value of fuels and biomass; measurement of the velocity of wind, waves and the energy that abound in them; laboratory production of biogas and determination of energy available in it; simple conversion of solar energy to electricity; transesterification of edible oil into biodiesel; simulation of geothermal energy; Geiger-Muller or Scintillation Counters' determination of uranium or thorium energy; simple solid or salt storage of energy; hybrid application of renewable energy.

GET 307 INTRODUCTION TO ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND CONVERGENT TECHNOLOGIES (3 Units C: LH 45)

Learning Outcomes

At the completion of the course, the students are expected to be able:

1. Explain the meaning, purpose, scope, stages, applications and effects of artificial intelligence;
2. Explain the fundamental concepts of machine learning, deep learning and convergent technologies;
3. Demonstrate the difference between supervised, semi-supervised and unsupervised learning;
4. Demonstrate proficiency in machine learning workflow and how to implement the steps effectively;
5. Explain natural languages, knowledge representation, expert systems and pattern recognition;
6. Describe distributed systems, data and information security and intelligent web technologies;
7. Explain the concept of big data analytics, purpose of studying it, issues that can arise with a data set and the importance of properly preparing data prior to a machine learning exercise; and
8. Explain the concepts, characteristics, models and benefits, key security and compliance challenges of cloud computing.

Course Contents

Concepts of human and artificial intelligence; artificial/computational intelligence paradigms; search, logic and learning algorithms. Machine learning and nature-inspired algorithms – examples, their variants and applications to solving engineering problems; understanding natural languages; knowledge representation, knowledge elicitation, mathematical and logic foundations of AI; expert systems, automated reasoning and pattern recognition; distributed systems; data and information security; intelligent web technologies; convergent technologies – definition, significance and engineering applications. Neural networks and deep learning. Introduction to python AI libraries.

TEL 305 ELECTRICAL MACHINES I

(3 Units C: LH 45)

Learning Outcomes

At the end of the course the student should be able to:

1. explain operating principles of fundamental components of Electric Machines: motors, generators and transformers including synchronous, asynchronous, DC and special purpose motors, AC, DC generators and autotransformers, CTs, PTs, step-up and stepdown transformers;
2. Examine the magnetic field, reluctance of magnetic materials, flux and mmf in magnetic circuits and perform transformer analysis using standard testing procedures including open-circuit and short-circuit tests, voltage regulation, efficiency and circuit analysis involving transformers;
3. Examine construction, working principles, characteristics and equivalent circuit of three phase synchronous generators, synchronous motors and induction motors, single phase induction and special purpose motors; and
4. Analyse voltage-current characteristics, commutation of DC generators, torque speed characteristics and speed regulation of DC motors.

Course Contents

DC Machine, Introduction to Machinery Principles, Rotational motion, Newton's Law and power relationships, the Magnetic field, Magnetic Circuit with air gap, Faraday's law, Production of induced force on wire, Induced voltage on a conductor moving in a magnetic field, Linear DC machine.; DC Machinery Fundamentals: Simple rotating loop between curved pole faces, Commutation, Construction, Simple armature winding, Armature reaction, Interpoles, compensating winding and brush shifting, Internal generated voltage and induced torque equations of real machines; DC Generators, Introduction, Voltage regulation, Magnetization curve, Equivalent circuits, Working and characteristics of separately excited, shunt, series and compounded generators, Parallel operations of direct current generators; DC Motors, Introduction, Speed regulation, Equivalent Circuits, Working and Characteristics of separately excited, Shunt and Permanent magnet, Working and Characteristics of series and compounded motors, Torque-speed Equations, Efficiency calculations, Stepper Motor and Drive circuit.; AC Machines Topics, Transformer Fundamentals, Importance of transformers, Types and construction, The ideal transformer, Leakage reactance, Theory and operation of single phase transformer, Losses and phasor diagram, the equivalent circuit of a real transformer, No load Engineering and Technology 337 New and short circuit test, the per unit system, the transformer voltage regulation and efficiency, Autotransformers and concept of its power rating advantages, Current transformer (CT) and Potential transformer (PT), Three phase Transformers, Construction of power Transformer, Three phase connections and harmonics suppression, Vector groups, Three phase transformer using two transformers, Transformer ratings and related problems, Transformer Inrush Current, AC Machines Fundamentals, A simple loop in a uniform magnetic field, Review of three phase generation, Proof of the rotating magnetic field concept and its relation with no. of poles, the relationship between electrical and mechanical degree, the relationship between electrical

frequency and the speed of the magnetic field rotation Induced voltage and induced torque, Losses and power flow diagram, Voltage regulation and speed regulation.; Synchronous Generator, Construction, Excitation system, Equivalent circuit of Synchronous Generator, Phasor diagram, Power and Torque, Measurement of model parameters, Effect of load changes on a generator, Parallel operation of generators; Synchronous Motor, Basic principle of motor operation, Equivalent circuit, Torque speed characteristics, Power and torque equation, Phasor diagram, the effects of load change, and field current change, Vcurves of synchronous motor and power factor correction, Starting of synchronous motor, Synchronous motor ratings; Three Phase Induction Motor, Construction, Basic concepts and working principles, Synchronous speed, Slip and its effect on rotor frequency and rotor voltage, Equivalent circuit, Power and torque, Torque speed characteristics, losses, efficiency and power factor; Single Phase and Special Purpose Motors, The Universal motor, Introduction to single phase induction motor, Starting single phase induction motors, Split phase windings, Capacitor start motor, Permanent split capacitor motor, Capacitor start and capacitor run motors, Shaded pole motors, Reluctance motors, the Hysteresis motor.

MEE 301 COMPUTER-AIDED DESIGN AND MANUFACTURE (3 Units C: LH 30; PH 45)

Learning Outcomes

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

1. Visualise and apply basic drafting fundamentals;
2. Prepare and edit engineering drawings;
3. Explain the concepts and underlying theory of modelling and the usage of models in different engineering applications;
4. Compare the different types of modelling techniques and explain the central role solid models play in the successful completion of CAD/CAM-based product development;
5. Produce CAD drawings (create accurate and precise geometry of complex engineering systems and use the geometric models in different engineering applications);
6. Use and assess commercial CAD/CAM tools efficiently, effectively and intelligently in selected engineering applications;
7. Take active role in product design and development process as well as prototyping;
8. Model 3D part and assemblies using Solidworks program (or alternative CAD software);
9. Analyse the part design using one of the computational methods (e.g. stress analysis) - calculate part features using math skills;
10. Demonstrate proficiency in the concepts of computer-aided manufacturing and a number of applied associated processes; and
11. Explain the basic concepts of CNC programming and machining.

Course Contents

Introduction to computer aided design (CAD). Basic data structuring technique. Computer graphics. Geometric transformation techniques. Mathematical bases for surface modeling: curves, surfaces and solids. Principles of solid modeling and application. CAD software. Introduction to CAM: Relation between production volume and flexibility. Various manufacturing systems – batch, mass, group, cellular and flexible manufacturing systems. Type of automation and benefits of soft or flexible automation. Automation in material handling and assembly. CNC machines: Introduction, classification, design and control features including interpolations. Numerical control and NC part-programming . Introduction to Robotics: Definitions, motivation, historical development. Basic structure, classification, workspace, drives, controls, sensors, grippers, specifications. Manual CNC programming (milling and turning). Basic and advanced CAD/CAM for CNC (milling and turning). Group project assignment.

BU-MEE 301 MECHANICAL ENGINEERING DESIGN I (3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of this course, the student should be able to

1. Apply the working principles and concepts of engineering design.
2. Explain the process involved in material selection.
3. Apply the analytical procedure in determining simple load stress.
4. Apply the learned basic engineering principles in the design of simple machine components.
5. Apply the learned basic engineering principles in the design of Fasteners and Locking Devices, Couplings, Clutches, Brakes, Springs, Seals, Bearing, Shafts and Flexible Mechanical Elements.
6. Apply the learned basic engineering principles in the design of Plastics Parts.
7. Perform the engineering design procedure by applying Computer Aided Design – AutoCAD Inventor.
8. Perform the engineering design procedure by applying Solid Works.

Course Content

Design Concept. Material and Process Selection. Simple Load Stress Analysis. Material Properties and Failure. Reliability. Applications to the Design of Simple Machine Components. Design of Fasteners and Locking Devices. Couplings. Clutches. Brakes. Springs. Seals. Bearing. Shafts. Flexible Mechanical Elements. Design of Plastics Parts. Computer Aided Design. Inventor. Solid Works.

BU-MEE 302 CONTROL SYSTEM IN MECHANICAL ENGINEERING

(3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of this course, the student should be able to

1. Explain the basic concept of Control Systems and Control System Design.
2. Apply the Mathematical Modeling of Physical System.
3. Enumerate the Characteristics of Feedback Control System.
4. Define the Time Domain Response Analysis of Control System.
5. Explain and apply the Stability Analysis of Linear Systems and Frequency Domain
6. Explain the basic concepts of Control Engineering and use of Transfer function.
7. Explain and apply the Mathematical Differential Equation Model of control Systems and Transducers.
8. Explain and apply the various methods of control systems analysis such as Automatic Control Methods, Time Domain Response Analysis, The Root-Locus Method and Frequency Response Analysis.
9. Define and apply the The Nyquist criterion in the design of Control System.
10. Explain and apply the PID controller, Classical tuning Procedure, and the Ziegler-Nicholas procedure in design of Control Systems.

Course Content

Introduction and Basic Concept of Control Systems. Control System Design. Mathematical Modeling of Physical System. Characteristics of Feedback Control System. Time Domain Response Analysis of Control System. Stability Analysis of Linear Systems. Control Engineering concepts - Transfer function. Differential Equation of control Systems. Transducers. Automatic control methods. Time Domain Response Analysis of Control System. The Root-Locus Method. Frequency Response Analysis. Stability Analysis in Frequency Domain. The Nyquist criterion. Control System Design. PID controller. Classical tuning Procedure - the Ziegler-Nicholas procedure.

BU-MEE 303 INTRODUCTION TO MECHATRONICS

(3 Units C: LH 30; PH 45)

Learning Outcomes

At the end of the SIWES, students should be able to:

1. Understand the architecture of mechatronic Systems
2. Identify the basis components of a mechatronic system
3. Analyse mechatronics systems
4. Design at least two (2) simple mechatronic system
5. Demonstrate the ability to develop an interdisciplinary understanding and integrated approach to mechatronics engineering

Course Contents

Introduction to the application of electronic control systems in mechanical and electrical engineering. Electronic components of a simple mechatronic system. Microcontrollers. Electronics. Sensors. Electric actuators. Stepper Motors. Motor Sizing. Circuit components. Circuit Review. Data acquisition Circuit. Control schemes. Modeling and simulation of dynamic systems. Power Transmission. Interface of Electromechanical Components.

Practical

Students should be able to design a simple Control System System.

GET 390 STUDENT INDUSTRIAL WORK EXPERIENCE II (4 Units C: 12 weeks)

Learning Outcomes

At the end of the SIWES, students should be able to:

1. Demonstrate proficiency in at least any three softwares in their chosen career choices;
2. Demonstrate proficiency in some animation videos (some of which are free on YouTube) in their chosen careers;
3. Carry out outdoor hands-on construction activities to sharpen their skills in their chosen careers;
4. Demonstrate proficiency in generating data from laboratory analysis and develop empirical models;
5. Demonstrate proficiency in how to write engineering reports from lab work;
6. Fill logbooks of all experience gained in their chosen careers; and
7. Write a general report at the end of the training.

The experience is to be graded and the students must pass all the modules of the attachment and shall form part of CGPA.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (Students are to proceed on three months of work experience i.e. 12 weeks during the long vacation following 300 level). Students are engaged in the more advanced workshops, indoor software design training similar to what they will use in the industry and outdoor construction activities to sharpen their skills. The use of relevant animation videos that mimic industrial scenarios is encouraged. Students are to write a report at the end of the training. As much as possible, students should be assisted and encouraged to secure 3 months placement in the industry. Examples of outline of activities and experiences to which students are expected to be exposed to earn prescribed credits include:

Section A: Welding and fabrication processes, automobile repairs, · lathe machine operations: machining and turning of simple machine elements, such as screw threads, bolts, gears, etc. Simple milling machine operations, machine tool maintenance and trouble-shooting, and wooden furniture making processes.

Section B: Mechanical design with computer graphics and CAD modelling and drafting.

Introduction to Solidworks: software capabilities, design methodologies and applications. Basics part modelling: sketching with SolidWorks, building 3D components, using extruded Bose base · Basic assembly modelling, and SolidWorks drawing drafting. Top-down assembly technique exploded view, exploded line sketch. Introduction to PDMS 3D design software; AutoCAD mechanical, SPSS.

A comprehensive case study design project. The student should be introduced to the concept of product/component design and innovation and then be given a comprehensive design project.

Examples of projects should include the following:

1. Design of machine components;
2. Product design and innovation;
3. Part modelling and drafting in SolidWorks; and
4. Technical report writing.

BU – GST 400 RELIGION AND SOCIAL ETHICS

(3 Units C:LH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Identify three (3) interrelatedness between religion and other social institutions;
2. Explain any five (5) effects of social changes on religion and ethics, since the 18th Century;
3. Evaluate any five (5) roles of religion in human and national development;
4. Explain any five (5) biblical approaches in developing a Christian worldview;
5. Illustrate five (5) uniqueness of the Bible in restoring social ethics and values in the society;
6. Demonstrate competence in providing biblical solution in five (5) areas of moral fluidity and/or ethical dilemma in your discipline and the society;
7. Explain any seven (7) biblical principles in personal, family, and/or professional life.

Course Contents

Religion and Society- Definitions. Culture. Traditions. Religions. Religion and Social changes. Role of Religion. Religion and Knowledge. Religion and Morality. Religion and Family Life. Religion and Gender Issues. Religion, Transgender and Homosexuality. Religion and Politics. Religion and Corrupt Practices. Religion and Violence. Religion and Environment. Religion, Food and Diet. Religion and Health. Religion, Education and the Bible. Religion and Business. Religion and Social Order. Religion and

Sanctity of Life. Merits and Demerits of Religion. Formation of Christian Worldview. Biblical Principles in Personal, Family, and Professional Life – Theory and Practice.

Minimum Academic Standard

Standard University Library with updated textbooks

BU – GST 440 E-PROJECT MANAGEMENT & SIMULATION (1 Unit C: LH 20, PH 40)

Learning Outcomes

Upon completion of the course, students should be able to:

1. explain the project management processes
2. discuss the project management knowledge areas
3. demonstrate the formulas, charts, and theories of project management
4. calculate float for complex project network diagrams
5. memorize the formulas for earned value management
6. compare and contrast processes, knowledge areas, theories, and project management best practices

Course Content

Defining Project Management Fundamentals. Initiating the Project. Planning the Project. Preparing to Develop the Project Schedule. Developing the Project Schedule. Planning Project Costs. Planning Human Resources and Quality Management. Communicating During the Project. Planning for Risk. Planning Project Procurements. Planning for Change and Transitions. Executing the Project. Executing the Procurement Plan. Monitoring and Controlling Project Performance. Monitoring and Controlling Project Constraints. Monitoring and Controlling Project Risks. Monitoring and Controlling Procurements. Closing the Project.

Lab Work: Students will undertake the following tasks in the practical classes; work on stakeholders requirements. Create a risk response team. Create a detailed work plan. Develop communication effective plan. Develop both leadership and technical competencies. Monitor and track progress regularly. Look out for potential risks.

Minimum Academic Standard: Computer studio and simulation Laboratory with a NUC-MAS requirement facilities.

GET 402 ENGINEERING PROJECT I

(2 Units: C; PH 90)

Learning Outcomes

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

1. Complete the design phase of a complex engineering problem sourced from industry or community during the SIWES III programme.
2. Demonstrate the connection between engineering product-making and the theoretical courses they have learned following the applicable industry best practices.

Course Contents

In the second semester of the 400-level students, preferably in groups, work from the university on the identified industry or organization to tackle industry complex engineering problems. Theoretical issues may be provided by the department faculty or industry experts. During the vacation, students will now work full time with the organisation/industry on the project as part of the SIWES III. The students can

also go beyond the department and engage in multidisciplinary undertakings. Literature survey, review of existing systems etc. must be achieved to a satisfactory extent.

GET 404 ENGINEERING VALUATION AND COSTING (2 Units: C; PH 90)

Learning Outcomes

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

1. Identify at least three (3) objectives of engineering valuation work, valuer's primary duty and responsibility and valuation terminologies.
2. Describe at least four (4) Valuer's obligation to his or her client, to other valuers, and to the society.
3. Demonstrate with example the engineering valuation methods, valuation standards, and practices.
4. Prepare engineering valuation and appraisal reports and review
5. Discuss expert witnessing and ethics in valuation.
6. Determine price, cost, value, depreciation and obsolescence in real property, personal property, personal property, machinery and equipment, oil, gas, mines, and quarries valuation.

MEE 401 MECHANICAL (MACHINE) ENGINEERING DESIGN II (2 Units C: LH 30)

Learning Outcomes

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

1. Demonstrate proficiency in the principles of design;
2. Demonstrate proficiency in the selection of materials for design;
3. Carry out simple stress analysis; and
4. Demonstrate proficiency in principles of coupling, clutches and brakes.

Course Contents

Journal bearings. Application of Hertz stress theory. Fluid couplings. Lubrication mechanics: hydrodynamic theory applied to tapered wedge and journal bearings and hydrostatic lubrication applied to journal bearings. Gears and power transmission systems. Elements of fluid power system design. Design of cylinders, pipes and pipe joints, tubes, plates and flywheel. Seals, packaging, gaskets and shields. Failure analysis; various types of joints, design of machine elements; system design, design of gear systems; material selection in design; design; design and production matching; optimisation in design D.

MEE 402 THEORY (MECHANICS) OF MACHINES I (2 Units C: LH 30)

Learning Outcomes

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

1. Identify the forces acting on a mechanism and the resolution of the forces;
2. Demonstrate understanding of the performance of various mechanisms and principal machine elements as regards their kinematics and dynamics;
3. Identify the types of motion and their applications;
4. Identify forces on shaft and bearing due to single revolving mass;
5. Demonstrate procedure for balancing several masses in different transverse planes;
6. Prepare professional quality solutions and presentations to effectively communicate the results of analysis and design;
7. Translate ideas and imaginations into conceptual designs using the tools of conventional engineering drawings and computer aided designs; and

8. Use the knowledge of the course to solve real life problems related to production processes and to develop machines.

Course Contents

Force analysis of mechanisms, fluctuation of kinetic energy and inertial effects. Complete static and dynamic analysis. Flexible shaft couplings: belt, rope and chain drives. The flywheel and mechanical governors. Brakes and dynamometers. Balancing of multi-cylinder engines. Balancing of machinery. Vibration of machinery; free and forced vibration, damping, natural frequencies and critical speeds. Transverse vibrations of beams, whirling of shafts and torsional vibrations.

MEE 403 APPLIED (ENGINEERING) THERMODYNAMICS I (2 Units C: LH 30)

Learning Outcomes

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

1. Apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon;
2. Identify fuel types, availability, utilisation and its conversion to energy, understand fuel chemistry, combustion analysis, develop combustion equations and conduct exhaust and flue gas analysis in the laboratory;
3. Identify enthalpy changes, determine heating values of fuels, steam generators;
4. Identify type of boilers, fuels and combustion controls in boilers and power plant efficiency;
5. Perform air standard cycle analysis, refrigeration and heat pump cycles and demonstrate their various application in internal combustion engines/refrigeration systems;
6. Demonstrate proficiency in energy analysis, fuel combustion and thermal systems design; and
7. Provide solution to thermodynamic problems in HVAC systems, power plant, engines or renewable energy technology.

Course Contents

Multistage reciprocating compressors. Rotary compressors – centrifugal and axial-flow; stagnation properties. Simple gas turbine plant. The steam power plant. Combustion of fuels; chemistry of common hydrocarbon fuels, combustion with deficiency or excess air. Thermo-chemistry: Hess' Law of Heat Summation; heats of combustion and reaction; ideal adiabatic flame temperature. Reciprocating internal combustion engines. General thermodynamics relations. Kinetic theory of gas. Mixture of gases, psychrometry, airconditioning and cooling towers. Introduction to heat transfer.

MEE 404 APPLIED FLUID MECHANICS (2 Units C: LH 30)

Learning Outcomes

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

1. Identify the various types of fluids and flows;
2. Carry out simple calculations on floating and submerged surfaces;
3. Explain the concept of fluid machinery for prototype development;
4. Explain concepts of boundary layer;
5. Explain and derive the Navier–Stokes equation for conservation of momentum and conservation of mass for Newtonian fluids;
6. Describe machines that transfer energy between a rotors and a fluids;

7. Identify pump types performed by simple pump selection, including both turbines and compressors; and
8. Perform simple CDD grid processing, calculations and result processing.

Course Contents

Unsteady flow; oscillation in U-tube; surge tank; water hammer. Open-channel flows. Introductory concepts of boundary layer and re-circulating flows, mathematical derivation of Navier-stokes equations and its application. Dimensional analysis and similitude. Introduction to turbo machinery; characteristic curve for axial-flow and centrifugal pumps, fans, blowers, impulse and reaction turbines. Pump selection and application. Pipeline systems (Series and Parallel). Open channel flow. Overview of computational (CFD).

MEE 405 HEAT AND MASS TRANSFER

(3 Units E: LH 45)

Learning Outcomes

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

1. Explain the principle of heat by diffusion under steady or unsteady conditions;
2. Explain continuity and momentum equations and their roles in convection heat transfer analysis;
3. Recognise convection heat transfer in laminar and turbulent flows;
4. Determine heat transfer coefficients in internal and external flows;
5. Identify dimensionless groups in convection heat transfer;
6. Identify combined modes of heat transfer;
7. Perform simple heat exchanger analysis and design;
8. Demonstrate an understanding of heat and mass transfer modes and models;
9. Demonstrate understanding of the different types of interface reactions;
10. Explain comparison of Fick's and Fourier's laws and similarities between conduction and mass transfer in stationary systems; and
11. Apply principles of heat and mass transfer phenomena to selected processes.

Course Contents

Convection heat transfer: Newton's law of cooling. Energy equation of convection. Continuity and momentum equations and their roles in convection heat transfer analysis. Convection heat transfer in laminar and turbulent flows. Internal and external flows. Heat transfer coefficients. Dimensional analysis and dimensionless groups in convection heat transfer. Convection heat transfer correlations. Heat exchanger analysis and design. Combined modes of heat transfer.

Mass transfer: Mechanisms of mass transfer. Fick's law of mass diffusion. General diffusion law. Rate equations. Comparison of Fick's and Fourier's laws. Equations of mass transfer in stationary systems. Similarities between conduction and mass transfer in stationary systems. Mass transfer coefficient. Electrical analogy of mass transfer. Equimolar counter diffusion. Drying and humidification of solids and gases. Types of dryers. Evaporation. Mass transfer correlations in convective systems.

MEE 407: ADVANCED MECHANICS OF MATERIALS

(2 Units C: LH 30)

Learning Outcomes

1. At the end of this course, the students should be able to:
2. Explain the theory, concepts, principles and governing equations of solid mechanics;

3. Demonstrate the ability to deconstruct complex problems to produce effective outcomes;
4. Perform simple analysis on thick cylinders; compound cylinders, rotating disks and bending of flat plates;
5. Perform simple analysis on beams on an elastic foundation;
6. Explain two-dimensional theory of elasticity and apply to elastoplastic problems;
7. Use analytical, experimental and computational tools needed to solve the idealised problem;
8. Use these solutions to guide a corresponding design, manufacture, or failure analysis;
9. Explain the selection, design and stress analysis of composite materials;
10. Analyse the stresses in simple structures as used in industry, and
11. Use interpersonal understanding, teamwork and communication skills working on group assignments.

Course Contents

Thick cylinders; compound cylinders. Rotating disks. Bending of flat plates. Beams on an elastic foundation. Membrane stresses in shells of revolution. Two-dimensional theory of elasticity. Elastoplastic problems and limit theory.

BU – MEE 407: ENGINEERING METALLURGY (3 Units C: LH 30; PH 45)

Learning Outcomes

On the completion of the course, the students should be able to:

1. Understand the mechanical and thermal properties of different metals or materials.
2. Understand the standard operational processes involved in heat treatment and testing of metals and materials
3. Distinguish the effect of different metallic processes.
4. Know the effect of the metallic processes on various properties of metal.
5. Discuss the applications of treated metals in the relevant fields.

Course Contents

Introduction to the electric structure of atom. Matter. Solid state crystallography. Relationship between structure and composition and the mechanical and thermal properties of materials of metals, alloys, plastics, ceramics, and natural products. Heat treatment. Annealing. Normalizing. Tempering. Hardening. Metallic corrosion and protection. Manufacture of high polymers. Properties of high polymers. Thermoplastic Resins. Thermosetting resins.

BU – MEE 408: FLUID DYNAMICS (3 Units C: LH 30; PH 45)

Learning Outcomes

On the completion of the course, the students should be able to:

1. Know the fluid properties and guiding principles
2. Understand the fluid properties for solving problems
3. Understand the mathematical theory of the motion of inviscid fluids.
4. Identify the differences between the compressible and incompressible flow
5. Distinguish between the laminar and turbulent flow

Course Contents

3. Apply Linear, Quadratic and Cubic Lagrangian Interpolation Formulae to solve interpolation problems.
4. Solve Linear and Nonlinear Ordinary and Partial Differential Equations by applying Euler method, Runge-Kutta
5. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Difference Method
6. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Volume Method
7. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Finite Element Method Rayleigh Ritz
8. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Galerkin Finite Element Method
9. Solve Linear and Nonlinear Two and Three Dimensions Partial Differential Equations by applying using Explicit, Semi Implicit and Implicit Finite Volume Method

Course Contents

Numerical Solution to Root Finding of Nonlinear Polynomial Equations – Bisection. Newton Raphson method and Secant method. Linear Systems of Equations – Gaussian Elimination. LU Decomposition and Gauss Seidel Methods. Lagrangian Interpolation Formulae – Linear. Quadratic and Cubic. Numerical Solution to Ordinary Differential Equations – Euler method. Runge-Kutta. Numerical Solution to Ordinary Differential Equations Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Ordinary Differential Equations Three Dimensional Problems Using Finite Difference. Numerical Solution to Partial Differential Equations of Two Dimensional Problems Using Finite Difference Method. Numerical Solution to Partial Differential Equations of Three – Dimensional Problems Using Finite Difference Method. Alternating Direct Implicit Three Dimensional Finite Difference Method (FDM). Numerical Solution to 35 Ordinary and Partial Differential Equations Using Finite Elements. Finite Volume Methods: Ritz. Finite Element Methods Rayleigh Ritz. Galerkin Finite Element Method. Explicit, Semi Implicit and Implicit Finite Volume Method.

GET 490 STUDENT INDUSTRIAL WORK EXPERIENCE III (4 Units C: 12 weeks)

Learning Outcomes

Students on Industrial Work Experience Scheme (SIWES) are expected to:

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 devise impactful solutions to them; and

5. Exploit the opportunity to improve and utilise their acquired critical thinking and innate creativity skills, during the program and SIWES Seminar presentation respectively.

Course Contents

On-the-job experience in industry chosen for practical working experience but not necessarily limited to the student's major (24 weeks from the end of the first semester at 400-Level to the beginning of the first semester of the following session. Thus, the second semester at 400-Level is spent in industry). Each student is expected to work in a programme related industry, research institute or regulatory agencies etc, for a period of 6 months under the guidance of an appropriate personnel in the establishment but supervised by an academic staff of the Department. On completion of the training, the student submits the completed Log book on the experience at the establishment., Also, there will be a comprehensive report covering the whole of the student's industrial training experiences (GET 290, GET 399 and GET 499), on which a seminar will be presented to the Department for overall assessment.

BU – GST 500 SEMINAR ON ADVENTIST HERITAGE (3 Units; C; LH 30; PH 45)

Learning Outcomes

On completion of the course, students should be able to:

1. Describe the four (4) dimensions/emphasis of Adventist education in relation to faith integration in teaching, learning, and life.
2. State at least seven (7) contributions of Ellen White to the Seventh-day Adventist Church
3. Assess five (5) benefits of Literature Ministry in relation to the Seventh-day Adventist Church mission
4. Analyze the meaning and implications of the Three Angels Messages
5. Assess Ellen G. White's counsels in relation any three (3) contemporary issues
6. Evaluate five (5) areas of Ellen White's counsels on Family life
7. Enumerate five (5) major contributions of Health Reforms, Health Institutions, and Medical Ministry to the growth of the Seventh-day Adventist Church
8. Develop at least two (2) community-based projects focused on service to humanity

Course Contents

Philosophy of Adventist Education. Harmonious Development. Biblical Foundation for Faith Integration. The Three Angels Messages. Spirit of Prophecy and Seventh-day Adventist Church. Ellen G. White's Conversion Story. E.G. White's Relationship with Jesus Christ. E.G. White's Writings and Contemporary Issues. Publishing Ministry. Family Life. Child Guidance. Health Ministry in Seventh-day Adventist Church. Health Reforms. Health Institutions. Healthy living. Alternative medicine. Medical Missionary. Health and Community Service. Dynamics of Community-based Projects. Benefits and Assessment of Community-based Projects.

Minimum Academic Standards

The presence of Ellen G. White Research Center, which contains ancient manuscripts; Conferences/Unions/Division's Health and Publishing Departments of Seventh-day Adventist Church.

BU – GST 540 INTRODUCTION TO DIGITAL MARKETING (1 Units; C; LH 15; PH 45)

Learning Outcomes

- i. Be able to develop and execute a marketing plan. incorporating all elements of the marketing mix. segmentation and positioning strategies and other elements.

- ii. Have an understanding of the role of both digital and traditional media in marketing, and the intersection of online and offline strategies and tactics.
- iii. Be able to guide the development of a digital presence from a marketing point of view.
- iv. Be proficient in marketing analytics and quantitative evaluation of the marketing environment.
- v. Have working knowledge of website design and development.
- vi. Familiarize oneself with the fundamentals of social media & digital marketing
- vii. Learn how to use existing social & digital marketing tools to achieve marketing and organizational objectives
- viii. Understand the concepts for creating engaging content & drive online campaigns
- ix. Create a framework to audit the current state of the digital assets
- x. Be able to develop and execute a marketing plan, incorporating all elements of the

Course Content

Digital Marketing Strategy: How the Internet works, understanding marketing strategy, the building blocks of marketing strategy, Crafting a digital marketing strategy.

Market Research: The importance of market research, Key concepts in market research, Online research methodologies, Justifying the cost of research.

Content Marketing Strategy: Defining Content marketing, Strategic building blocks, Content creation, Content channel distribution.

User Experience Design: Understanding UX design, Core principles of UX design, Mobile UX, Step-by-step guide to UX design.

Web Development and Design: Web development, Mobile development, Step-by-step guide to building a website.

Writing for Digital: Writing for your audience, Types of web copy, HTML for formatting, SEO copywriting, best practices for online copywriting.

Customer Relationship Management: A CRM model, understanding customers, CRM and data, the benefits of CRM, Social CRM, Step-by-step guide to implementing a CRM strategy.

GET 501 ENGINEERING PROJECT MANAGEMENT (3 Units C: LH 45)

Learning Outcomes

At the end of the course, students should be able to:

1. Explain the basics of project management as it relates to the Engineering discipline;
2. Demonstrate knowledge and understanding of engineering, management and financial principles and apply these to their own work, as a member and/or leader in a team, to manage projects and in multi-disciplinary environments;
3. Conduct, manage and execute projects in multi-disciplinary areas;
4. Possess the skills needed for project management; and
5. Work within the budget when executing a project for proper management.

Course Contents

Project management fundamentals – definitions, project environment, nature and characteristics, development practice, management by objectives, and the centrality of engineering to projects, infrastructures, national and global development. The scope of project management – organizational, financial, planning and control, personnel management, labour and public relations, wages and salary

administration and resource management. Identification of project stakeholders; beneficiaries and impacted persons – functions, roles, responsibilities. Project community relations, communication and change management. Project planning, control and timeliness; decision making, forecasting, scheduling, work breakdown structure (WBS), deliverables and timelines, logical frameworks (log frames), risk analysis, role of subject matter experts (SMEs), role conflicts; Gantt Chart, CPM and PERT. Optimization, linear programming as an aid to decision making, transport and materials handling. Monitoring and Evaluation – key performance indices (KPIs); methods of economic and technical evaluation. Industrial psychology, ergonomics/human factors and environmental impact considerations in engineering project design and management. Project business case - financial, technical and sustainability considerations. Case studies, site visits and invited industry professional seminars. General principles of management and appraisal techniques. Breakthrough and control management theory; production and maintenance management. Training and manpower development. The manager and policy formulation, objective setting, planning, organising and controlling, motivation and appraisal of results.

GET 502 ENGINEERING LAW

(2 Units C: LH 30)

Learning Outcomes

Students will be able to:

1. Describe and explain the basic concept, sources and aspects of law;
2. Describe and explain the major differences between the various categories of law, courts and legal jurisdictions;
3. Describe and explain legal principles and their application in professional engineering design and management services and their professional liability implications; and
4. Develop reasoned analysis of real-life or hypothetical engineering scenarios using the legal principles undertake critical analysis of reliable information to develop, and practically present technical reports for use in varying judicial/quasi-judicial settings including as an expert witness.

Course Contents

Common Law: its history, definition, nature and division. Legislation, codification interpretation. Equity: definition and its main spheres. Law of contracts for Engineers: Forms of contract and criteria for selecting contractors; offer, acceptance, communication termination of contract. Terms of Contracts; suppliers' duties – Damages and other Remedies. Termination/cancellation of contract Liquidation and Penalties; exemption clauses, safety and risk. Health and Safety. Duties of employers towards their employees. Duties imposed on employees. Fire precautions act. Design for safety. General principles of criminal law. Law of torts: definition, classification and liabilities. Patents: requirements, application, and infringement. Registered designs: application, requirements, types and infringement. Company law. Labour law and Industrial Law. Business registration.

MEE 501 APPLIED DESIGN

(2 Units C: LH 30)

Learning Outcomes

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

1. Demonstrate proficiency in systematic scientific design methodology;
2. Demonstrate creative application of the design process to engineering problems;
3. Demonstrate proficiency in design for the manufacture of complete mechanical systems and devices;
4. Undertake a group design project;

5. Submit reports showing all calculations, justification for choice of design and instructions on detail design, manufacture, testing and use; and
6. Demonstrate use and evaluation of a CAD/CAM software package in the actual manufacturing design project.

Course Contents

Scientific Design Methodology: creative application of the design process to engineering problems with emphasis on the manufacture of complete systems to accomplish overall objectives of minimum weight, high efficiency while satisfying the design constraints. An appreciation of the process of engineering design, and of systematic procedures and tools usable in the design process, with particular reference to mechanical systems and devices. Topics include systematic problem definition, search for possible solutions, statistical analysis of stress/strength interference, experiment planning techniques, optimum design for minimum weight and cost, and management of the design process. Design Project: Students will be required to conduct a design project under supervision, using the presented techniques, and taking at least to a workable layout drawing of a device. The design should involve simple mechanical systems (e.g. testing and assembling devices, heat drive, etc.) for a specified duty, analyse its operating conditions and after considering the design criteria, choose between potential solutions. Reports submitted by students should contain all calculations, a comparison of potential solutions, justification for the design finally chosen, and instructions on detail design, manufacture, testing and use. Use and evaluation of several CAD/CAM software packages. Students will gain experience with CAD/CAM software while carrying out an actual manufacturing design project.

BU-MEE 501 AUTOMATION AND CONTROL ENGINEERING (3 Units C: LH 15; PH 45)

Learning Outcomes

At the end of this course the students should be able to:

1. Explain the theoretical knowledge acquired in Machine designs, engineering materials coupled with strength of material courses in the design of Drones, Rockets and Robotic (DRR) machines/engines
2. Explain the theoretical knowledge acquired in Machine designs, engineering materials coupled with strength of material courses assembling and constructions of Drones, Rockets and Robotic (DRR) machines/engines
3. Apply the technical know-how in the enabling atmosphere/environment for the design and construction DRR machines/engines
4. Apply the technical know-how in the enabling atmosphere/environment for the assembling and construction of DRR machines/engines
5. Perform / carry out the design and construction DRR machines/engines
6. Perform / carry out the assembling and construction of DRR machines/engines
7. Perform / carry out the maintenance, repair and overhauling of Drones, Rockets and Robotic machines.

Course Contents

Introduction to Drone technology, Types of drones, Basic principles of operation of drones, Design of drones, Construction / assembly and manufacturing of drones, Functions and application of drones, Introduction to Rocket technology, Introduction to Rocket vehicle, Basic principles involve in its design, Construction of rockets, Launching and functions of rockets, Introduction to Robotics, Basic Principles

involve in the design of Robots, Construction of Robots, Operations of Robots, Functions and application of Robots. Special project.

BU-MEE 502 AUTOMOTIVE TECHNOLOGY (Units C: LH 15; PH 45)

Learning Outcomes

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

1. Explain the theoretical knowledge acquired in thermodynamic and internal combustion courses in relating to practical automobile engineering problems.
2. Apply the skills in the design and manufacturing of either partly or complete automobile engineering systems and devices
3. Illustrate proficiency in the maintenance, repair and overhauling of automobile engines and devices.
4. Apply the acquired knowledge in solving automobile engineering problems.
5. Apply for the manufacture of either partly or complete automobile engineering systems and devices
6. Applying the, repair and overhauling of automobile engines and devices
7. Explain the basic systems of the Automobile systems such as the engine system, suspension & control, Power Transmission Systems, Starting and charging system, Lighting and Ignition systems
8. Perform the Panel repairs, Panel painting, and Work Ethics.
9. Perform the transmission; electrical and steering systems etc.
10. Explain the trouble shooting process of the automobile system.
11. Explain the Vehicle Design & Structures, Automotive Mechatronics I, Maintenance & Testing, and Materials & Structures

Course Contents

Basic Workshop skills; Automobile Engine systems; Vehicle suspension; control; Power Transmission Systems; Starting and charging system; Lighting and Ignition systems. Direct current Motors, Vehicle instrumentation; Panel repairs, Panel painting, Work Ethics. Automobile structure and functions of components; engine; transmission; electrical and steering systems etc. Trouble shooting. Vehicle Structures, Automotive Combustion, Power Train & Noise, Vibrations and Harshness, Vehicle Design, Automotive Mechatronics I, Automotive Maintenance & Testing, Automotive Materials & Structures

BU-MEE 503 SOLAR POWERED MANUFACTURING AND SERVICE (3 Units C: LH 15; PH 45)

Learning Outcomes

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

1. Identify and describe the various types of renewable sources of energy
2. Determine the process and efficiency of harnessing solar energy
3. Identify and provide solutions to the various problems associated with solar panels
4. Quantify the power consumption and energy efficiency of the refrigeration system
5. Identify and describe the various types of refrigerating systems
6. Understand the various applications of refrigeration and air-conditioning
7. Fabricate all the components of the solar powered refrigeration and air-conditioning systems
8. Couple and implement the solar powered refrigeration and air-conditioning systems

9. Understand and implement the process of servicing and maintenance of the solar powered refrigeration and air-conditioning systems

Course Contents

Basics principle of refrigeration and air-conditioning systems, Different types of refrigeration systems and their working principles, Functions of Components of refrigeration and air-conditioning systems, Refrigerants and their specific applications, Vapour Compression Refrigeration system and Its Applications, Vapour absorption refrigeration cycle and Its Applications, Vapour Adsorption and Electrolux refrigeration cycles and Their Applications, Power consumption and Energy Efficiency of Refrigeration Systems, Renewable and Alternative Power sources, Power and Thermal Applications of Solar Power Systems, Working Principle of Solar Panel (Photovoltaic) and Solar Collector, Solar Powered Vapour Compression Refrigeration system using Photovoltaic., Solar Powered Vapour Absorption Refrigeration system using Solar Collector., Design analysis of Various Components of Solar-powered refrigeration systems, Production, servicing and maintenance of solar powered refrigeration systems, Revision and Examination.

BU-MEE 504 REFRIGERATION AND AIR CONDITIONING (3 Units C: LH 15; PH 45)

Learning Outcomes

At the end of this course, the student should be able to –

1. Identify and apply the basic and specialized hand tools used.
2. Identify, apply, and itemize different types of instruments required to record temperature, pressure, and heat
3. Identify and apply electrical test instruments and explain the distribution of electrical power.
4. Perform the troubleshooting of gas heaters.
5. Perform the installation of solar hydronic radiant heat in the floor.
6. Construct all connections for solar hydronic radiant heat systems.
7. Identify the compressors, evaporators, condensers, connecting refrigerant lines, and system accessories;
8. Select pipe, tubing, and fittings; flare, bend, and swag tubing; and perform soft soldering, silver brazing techniques.
9. Define terms associated with sealed system components (condensing units) and to discuss, list, identify, operate, and repair them.
10. Explain the basics of electrical controls, refrigeration de-frost controls, mechanical servicing, and troubleshooting techniques.
11. Explain the effects of CFC refrigerants on the ozone layer of the atmosphere
12. Identify the functions of water-cooling towers, shell and tube condensing units

Course Contents

Introduction to safety in air conditioning, refrigeration, and heating; Fundamentals of mathematics for air conditioning, refrigeration, and heating; Basic tools for air conditioning, refrigeration, and heating; Air conditioning, refrigeration, and heating measurements; Electrical theory and applications; Heating theory and applications; Basic compression refrigeration; Tubing, piping, and soldering; Condensing units; Air conditioners; Heat pumps; Domestic and commercial refrigerators; Recovery, recycling, and reclaiming; Industrial refrigeration; Ductwork application; Professional development.

BU-MEE 505 INTRODUCTION TO BIOMECHANICS

(2 Units E: LH 30)

Learning Outcomes

At the end of this course the students should be able to:

1. Understand the basis human anatomy.
2. Explain five (5) principles of biomechanics.
3. Know three (3) branches of Biomechanics.
4. Understand the fundamental concepts of viscoelasticity of tissues as it relates to cartilage, ligament, bone and muscles.
5. Identify and analyse at least one (1) biomechanical problems and proffer experimental/analytical methods as solution.
6. Discover new emerging trends in biomechanics engineering research.

Course Contents

Overview of Biomechanical Engineering. Principles of Biomechanics. Branches of Biomechanics. Cell Biology. Stress-Strain analysis and relations. Tissue Biomechanics. Orthopedic Biomechanics. Musculoskeletal Biomechanics. Cell Biomechanics. Bio-fluid Mechanics. Mechanotransduction. Navier-Stokes Equation. Healthcare applications.

MEE 590 B ENG. PROJECT

(6 Units C: LH/PH 270)

Learning Outcomes

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

1. Identify an engineering research problem;
2. Demonstrate proficiency in PowerPoint presentation in a seminar;
3. Demonstrate a methodology for actualising aims and objectives of a research project;
4. Partake in a group research project efficiently; and
5. Submit report comprising a topic, abstract, problem statement, aims and objectives, methodology, experimentation and/or analysis, results and analysis, conclusion and recommendation.

Course Contents

Final-year projects are assigned at the beginning of each academic year. Each final year student chooses a project supervisor in consultation with the final-year project coordinator. The process is entirely interactive, but the coordinator ensures that there is an even distribution of students amongst the lecturers. The final topic is decided by the student and his supervisor, selected from the fields of mechanics of solids and fluids, materials science, machine design, heat power, heat transfer, production technology, industrial engineering and management. Each student presents at least two seminars as part of their final year project, usually at the beginning and ending of the second semester. Each student is required to submit a report of their findings and undergo an oral examination. All seminars are scored by a panel of lecturers.

Stress Individual student or group of students' projects undertaken to deepen knowledge, strengthen practical experience and encourage creativity, entrepreneurship and independent/team work (as may be the case). The project ends in a comprehensive written report of a developed system, and/or product/service and oral presentation/defense before a panel of assessors one of whom must be external to the University awarding the electronic engineering degree.

OPTIONS

BU-MEE 511 THEORY OF ELASTICITY AND PLASTICITY (3 Units C: LH 45)

Learning Outcomes

1. The students shall be able to demonstrate the application of plane stress and plane strain in a given situation
2. The student will demonstrate the ability to analyze the structure using plasticity.
3. To impart the knowledge of stress-strain relations for linearly elastic solids, and Torsion.

Course Contents

Application of the theory of elasticity to two- and three-dimensional problems in engineering; Stress concentration round holes; Discs, wedges under point loading, etc. Experimental stress analysis, strain gauging, photo-elasticity and holography. Approximate methods; Finite element method.

Fundamentals of plasticity; Stress and strain relations; Yield criteria. Various approximate methods applied to elastoplastic problems of bending of beams and torsion and bars. Plastic limit design.

BU-MEE 512 FRACTURE OF STRUCTURE MATERIALS (3 Units C: LH 45)

Learning Outcomes

1. Have a solid foundation in the theory, concepts and principles of fracture mechanics.
2. Be gaining the physical intuition necessary to idealise a complicated practical problem.
3. Possess the analytical and computational tools needed to solve the idealised problem.
4. Have acquired the judgment required to interpret the results of these solutions.
5. Students shall be able to identify the plane stress and plane strain conditions based on the shape and size of plastic zones. This concept made them capable to select the type of analysis subjected to plane stress and plane strain condition
6. Be able to work independently and as part of a team in order to implement their skills and knowledge in both theoretical and practical applications

Course Contents

Historical development of fracture mechanics. Conventional design concepts in relation to fractures; the mechanics of fracture. Designing and testing for fracture resistance. Deformation behavior of structural materials. Microscopic aspect of fracture. Fracture of specific materials. Fatigue. Experimental methods for determining fatigue resistance. Micromechanisms of fatigue fracture Damage tolerance, design considerations and failure analysis. Methodologies for failure analysis.

BU-MEE 521 INDUSTRIAL AND PRODUCTION ENGINEERING

(3 Units C: LH 30; PH 45)

Learning Outcomes

1. Be able to apply the principles of advanced engineering math and science to the solution of problems in engineering
2. Acquire fundamental knowledge and understanding of Production and Industrial Engineering.
3. Design and validate technological solutions to defined problems and write clearly and effectively for the practical utilization of their work.
4. Be able to integrate the use of modern and relevant computer-based engineering tools and models o sole production engineering problems.

Course Contents

Industrial Health and Safety. Ergonomics of Machine Tools. Tool Geometry. Mechanisms of chip formation. Principles of Metal Cutting. Tool Materials. Cutting forces. Cutting Temperatures. Tool wear. Tool life. Cutting Fluids. Optimization of cutting parameters. Variables affecting Metal Removal Rate. Principles of Metal cutting with single-point tools. Principles of Metal cutting with multi-point tools. Batch production. Mass production. Finishing: micro-finishing operations like honing, lapping, superfinishing. Time and cost estimates in Production. Merchant Analysis.

Operations Management, Quality Engineering. Applied optimization in Engineering Design. Product Design and Development. Industrial Automation. Advanced Materials Technology. Quality and Maintenance. Production development tools and methods. operations strategy, planning, control and resources management Mechatronics.

BU-MEE 522 ENGINEERING DESIGN AND MANUFACTURING PROCESSES

(3 Units C: LH 30; PH 45)

Learning Outcomes

1. The student will be having the capability of selecting suitable manufacturing processes for manufacturing products optimally.
2. The student will be able to recommend the appropriate design of gating systems, forming processes, welding process.
3. The student will be able to develop simplified manufacturing processes with the aim of reduction of cost and manpower.
4. The student will be able to identify/control the appropriate process parameters, and possible defects of manufacturing processes so as to remove them.
5. The student will be able to make use of the softwares and CAD/CAM tools meant for optimizing manufacturing processes.

Course Contents

Manufacturing industries and process that includes casting and pattern design, forging & extrusion, assembling, inspection/testing and certification, packaging, warehousing and forwarding. Metal working operations: shaping, planing, milling, boring, grinding, drilling, turning, reaming, broaching, abrasive machining and chipless machining processes. Metal cutting tools and cutting fluids, cutting forces and power. Threads, gears, selection of materials, processing methods and equipment for manufacturing. Fabrication methods including welding, soldering, brazing, adhesive bonding and mechanical fastening. Quality control in manufacturing and production.

Introduction to elements of design process including strategic, planning, project, management. Modelling. Materials selection. Engineering economics. Safety. Environmental issues and ethics.

CAM/CAD. Advanced Manufacturing Processes. Rapid Prototyping.

BU-CEE 511 BUILDING SERVICES ENGINEERING

(3 Units C: LH 30; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. understand the Engineering study of the materials and equipment used in mechanical and electrical services of buildings.

2. Design of building services components; modern building operation; selection of necessary equipment. Specific topics like illumination of building, comfort, heat loss and heat gain, air conditioning and climate control, water supply and fire protection.
3. Design drainage systems, plumbing and sewage disposal, elevators, escalators, building acoustics.

Course Contents

Engineering study of the materials and equipment used in mechanical and electrical services of buildings. Design of building services components; modern building operation; selection of necessary equipment. Specific topics like illumination of building, comfort, heat loss and heat gain, air conditioning and climate control, water supply and fire protection. Drainage systems, plumbing and sewage disposal, elevators, escalators, building acoustics.

BU-MEE 532 TURBO MACHINERY

(3 Units C: LH 30; PH 45)

Learning Outcomes

Upon completion of the course, students should be able to:

1. Review the fundamental principles of thermodynamics and fluid flow.
2. Know the application of the fundamentals of thermodynamics in turbomachinery
3. Understand the Euler Energy Equation
4. Understand the fundamentals of axial flow turbine and compressor.
5. Apply the basic principles of fluid flow in turbomachines to design the a simple turbine or compressor

Course Contents

Principles of turbomachinery. Moment of momentum principles. Hydraulic Turbines – Pelton-, Francis-, Kaplan- and gas-turbines. Wind Turbines. Compressors. Pumps. Fans. Performance characteristics of turbines. Performance characteristics of compressors. Performance characteristics of pumps. Specific speed. Matching of pump and load. Cascade theory. Mach number effects. Euler Energy Equation. Flow conditions and performance. Fluid couplings and torque converters.