DEPARTMENT OF CIVIL ENGINEERING,
FACULTY OF ENGINEERING AND TECHNOLOGY
UNIVERSITY OF ILORIN, ILORIN, NIGERIA

STUDENTS' HANDBOOK
(UNDERGRADUATE PROGRAMME)

2026

UNIVERSITY OF ILORIN, NIGERIA

BRIEF HISTORY

The University of Ilorin is one of the second-generation universities established by a Decree of the Federal Military Government in August 1975. It was initially an affiliated College of the University of Ibadan, known as the University College, Ilorin and attained full autonomous status as University in October, 1977. The University, which started with three (3) Faculties has grown in leaps and bounds to attain its present expansion to sixteen (16) Faculties. Starting with 200 students, the University presently has a total number of 50,833 students. The University runs and awards certificates in the following programmes: Diploma, Undergraduate Degree, Postgraduate Diploma, and Postgraduate Degree. In addition, the University currently has a total number of 3,652 staff members (both academic and non-teaching). The University, as part of its prowess as a citadel of learning, has won to its credit, several medals and awards in both academic and extra-curricular activities, nationally and internationally. The University of Ilorin emerged as the overall best institution at the Fourth Edition (2021/2022 – 2022/2023) of the Joint Admissions and Matriculation Board (JAMB) **NATIONAL TERTIARY ADMISSION PERFORMANCE- MERIT AWARD (NATAP-M)**.

MISSION STATEMENT

To provide a world-class environment for learning, research, and community service.

VISION STATEMENT

To be an International Centre of Excellence in learning, research, probity, and service to humanity.

MOTTO: Probitas Doctrina (Probity and Scholarship)

COLOURS: Deep Blue, Green, Golden, and White

MASCOT: Eagle Wide Span

PRINCIPAL OFFICERS OF THE UNIVERSITY

The Vice-Chancellor
Professor. Wahab Olasupo EGBEWOLE, *SAN*
LL.B (Hons) (Ile-Ife); B.L. (Lagos); LL.M (Ile-Ife); Ph.D. (Ilorin); *FCArb, Fspsp, fciml (USA), fnipr*

The Deputy Vice-Chancellor (Academic)
Professor. Moji Taibat BAKARE-ODUNOLA
B.Sc. (Maiduguri), M.Sc., Ph.D. (ABU Zaria)

The Deputy Vice-Chancellor (Management Services)
Professor. Olalere ADEYEMI
B.A., M.A., MPA., Ph.D. (Ilorin)

The Deputy Vice-Chancellor (Research, Technology & Innovation)
Professor. Muhtar Adeiza Etudaiye,
LL.B. (ABU Zaria), B.L. (Lagos), LL.M. (OAU), Ph.D. (Ilorin)

The Registrar
Mr. Mansur Adeleke ALFANLA
B.A. Comb. Hons. (Kano), LL.B. (Ilorin), B.L. (Abuja), LL.M. (Ilorin), *fciml (USA)*

The Bursar
Mr. Abiodun LAWAL
B.Sc. M.A (Ilorin), FCNA

The University Librarian
Professor. Kamal Tunde OMOPUPA
B.A. (LS) (Kano), MILR (Ilorin), MLIS (Ibadan), Ph.D. (SA), *fciml (USA)*

FACULTY OF ENGINEERING AND TECHNOLOGY

History of the Faculty of Engineering and Technology, University of Ilorin

The Faculty of Engineering and Technology at the University of Ilorin was established in September 1978, with the primary objective of providing a robust institutional framework for training engineers capable of driving the technological development of Nigeria and the world. From its inception, the faculty has fostered a conducive environment for the education of undergraduate engineering students and has facilitated cutting-edge research activities among its academic staff. Over the years, the faculty has expanded its programs to include postgraduate training, offering master's and doctoral degrees in various engineering disciplines.

Departments and Growth

At its founding, the faculty started with three departments: Civil Engineering, Electrical Engineering, and Mechanical Engineering, alongside a Central Engineering Workshop, which was established in 1979 to provide hands-on training and practical experience to all engineering students. The faculty's academic and research programmes were designed to attract students with strong backgrounds in mathematics and physical sciences, with an emphasis on logical, imaginative, and creative problem-solving skills.

The faculty's commitment to academic excellence and research has led to the expansion of its programmes over the years. In 1982, the Department of Agricultural Engineering was established as the faculty's fourth department. Subsequent additions include:

- Department of Chemical Engineering (2008/2009)
- Department of Materials and Metallurgical Engineering (2010)
- Department of Water Resources and Environmental Engineering (2013)
- Department of Computer Engineering (2014)
- Department of Biomedical Engineering (2015)
- Department of Food Engineering (2014/2015)

As of the 2020/2021 academic session, the Faculty of Engineering and Technology had grown to host 3,351 undergraduate students across its ten departments. The faculty has been led by a series of distinguished Deans since its inception. Below is a list of the past and present Deans:

1. Prof. V.O.S. Olunloyo (Mechanical Engineering, 1978-1980)
2. Prof. I.E. Owolabi (Electrical and Electronics Engineering, 1980-1984)
3. Prof. B.J. Olufeagba (Electrical and Electronics Engineering, 1984-1988)
4. Prof. S.O. Adeyemi (Civil Engineering, 1988-1990)
5. Prof. J.S.O. Adeniyi (Mechanical Engineering, 1990-1994)
6. Prof. F.L. Bello-Ochende (Mechanical Engineering, 1994-1998)
7. Prof. K.C. Oni (Agricultural and Biosystems Engineering, 1998-2001)

8. Prof. O.A. Adetifa (Civil Engineering, 2001-2005)
9. Prof. B.F. Sule (Civil Engineering, 2005-2009)
10. Prof. J.O. Olorunmaiye (Mechanical Engineering, 2009-2013)
11. Prof. Y.A. Jimoh (Civil Engineering, 2013-2017)
12. Prof. D.S. Ogunniyi (Chemical Engineering, 2017-2021)
13. Prof. O.A. Lasode (Mechanical Engineering, 2021-2023)
14. Prof. J.K. Odusote (Materials and Metallurgical Engineering, 2023-2025)
15. Prof. J.O Olaoye (Agricultural and Biosystems Engineering, 2025-Present)

The faculty has also benefited from the support of dedicated administrative staff, including several Senior Registry staff who have served as Faculty Officers. These officers play a crucial role in facilitating the activities of students from admission to graduation and supporting staff from recruitment to retirement. Notable present Faculty Officers include Mrs. Docars D. Adu, Muktar Lukman Abiodun, A.B. Shuaib, Oluseun Jolayemi, A.J. Anate, Abdulateef Bello, Hassana Adegbite, Dr. A.S. Alawaye, A.O. Shuaib, Grace A. Abajo, Mrs. Adeniyi, Adetola Oluwakemi, J.K. Omotosho, Mrs. Nimotallahi Ismail, Lamidi Helen and A.M. Adisa who currently serves in the role. The Faculty of Engineering and Technology hosts an annual international conference known as the Faculty of Engineering and Technology International Conference (FETiCON). Additionally, the Faculty publishes the Nigerian Journal of Technological Development, a Q4 journal indexed in Scopus and Scimago, which highlights research and innovations in engineering and technology.

The Faculty of Engineering and Technology continues to strive towards improving the quality of education and research offered to its students. Through regular curriculum reviews and a focus on innovative research, the faculty aims to remain at the forefront of engineering education in Nigeria and beyond, contributing to both national development and the global engineering community.

VISION STATEMENT

To be a leading and globally renowned Department in the Civil Engineering discipline through quality theoretical and technical training of students and contributions of cutting-edge research and innovations.

MISSION STATEMENT

To nurture and produce qualified Civil Engineering graduates who can confidently plan, design, develop, operate, and maintain infrastructures and utility services at local, national, and global levels, and be versatile in innovative research and development.

DEPARTMENT OF CIVIL ENGINEERING

Historical Background

The Department of Civil Engineering was established in 1978 and the first set of students were admitted the same year into the first year. This set graduated in 1983. The Department is devoted to the preparation of students in the Department, upon after graduation, for professional practice in the design, construction and maintenance of structures (buildings, bridges, towers etc.), sanitary systems (water supply, sewage disposal etc), transportation systems (streets, highways, airports etc) and earth structure and foundations. Civil Engineers carry out their work through service in and for government or its agencies, in consulting firms and construction firms and in other similar outfits. The curriculum for the Bachelor of Civil Engineering was planned to provide the graduate with solid foundation in the Natural and Physical Sciences, Mathematics and Engineering fundamentals. In addition, the programme focuses on various applications of engineering fundamentals and acquisition of skills needed to function effectively as a professional in the society.

VISION STATEMENT

To be a leading and globally renowned Department of Civil Engineering that produces competent, ethical and innovative engineering graduates through outcome-based theoretical and technical training, cutting-edge research, and impactful contributions to sustainable national and global infrastructure development.

MISSION STATEMENT

To provide outcome-based Civil Engineering education that produces industry-ready, ethical graduates capable of designing, building and managing sustainable infrastructure, and driving research and innovation for societal impact.

Staff List of the Department

S/N	Name	Rank	Qualifications	Area of Specialization
Academic Staff				
1.	I. T. Yusuf	Professor /HOD	B.Eng., M.Eng, Ph.D. (Ilorin) 2014, MNSE, R. Engr. (COREN)	Transportation & Geotechnics
2.	O. O. Adeleke	Professor	B.Sc., M. Sc. (Lagos), Ph.D (Ilorin) 2011, Reg Surveyor (SURCON)	Transportation & Goeinfomatics
3.	A. A. Jimoh	Professor Adjunct	B. Eng., M. Eng., Ph.D. (Ilorin) 2006, MNSE; R. Engr. (COREN)	Structures & Materials
4.	Y. O. Babatunde	Lecturer I	B. Eng., M.Eng (Ilorin). Ph.D. (PAUSTI, Kenya); R.Eng. (Nigeria)	Structures and Construction Materials
5.	Funmilayo. R. Adeoti	Lecturer I	B. Eng., M.Eng.Ph.D. (Ilorin) ; R.Eng. (Nigeria)	Transportation & Geotechnics
6.	Christianah T. Folowosele	Assistant Lecturer	B. Eng., M.Eng. (Ilorin)	Structures and Materials
7.	A. A. Adedeji	Professor Adjunct	B.Eng. M. Sc. (Prague), Ph.D. (Zaria), MNICE, R. Eng. (COREN)	Structures
8.	Y. A. Jimoh	Professor Adjunct	B.Eng. M. Sc. Ph.D. (Zaria), 1991, FNSE, FAEng, R. Eng. (COREN)	Geotechnics and Transportation
9	A.A. Amadi	Professor	B.Eng. (Enugu), M.Sc., Ph.D. (Zaria), MNSE; MNICE; R.Engr (Nigeria)	Environmental Geotechnics, Geoenvironmental Engineering
10	A.A. Bello	Professor	B.Tech. (LAUTECH), M.Sc.(UI), Ph.D. (Zaria), MNSE; MNICE; R.Engr (Niger	Geotechnical and Geoenvironmental Engineering
11	S. O. Odeyemi	Professor	B.Eng., M.Eng., Ph.D. (Unilorin), MNS MNICE; R.Engr (Nigeria)	Structures & Materials
12	Y. A. Iorliam	Senior Lecturer	B.Eng. (Makurdi), M.Sc (UI)., Ph.D. (U MNSE; MNICE; R.Engr (Nigeria)	Geotechnical and Geoenvironmental Engineering
13	O. A. Toluhi	Adjunct Lecturer	B.Eng.; M.Eng., Ph.D., (Unilorin); MN R.Engr. (Nigeria).	Transportation Planning
14	K. S Adejumo	Lecturer II	B.Tech, M.Tech (Ogbomosho), R.Eng	Transportation and Highway
15	U. Muhammed	Lecturer II	B. Engr. (Ilorin) M.Sc (Ibadan) (COREN)	Structures & Materials
16	Rasheedat .A. Sayi	Lecturer II	HND Arch. Tech (Kwara.Poly), B. Eng (Ilorin), M.Eng. (KWASU), (ARCON, COREN)	Structures & Materials
17	A.O Amao	Lecturer II	B.Eng (Futminna) , M.Eng(Kwasu), MNSE; R.Engr (Nigeria)	Structures & Materials
18	A.O Okunlola	Assistant Lecturer	B.Eng (Unilorin), M.Sc (Unibadan)	Structures & Materials
19	M. O. Raji	Graduate Assistant	B. Engr. (Ilorin)	Structures & Materials

20	Z.I. Adedo	Senior Lecturer	B.Arch.; M. Arch.	Building Architecture
21	O. G. Okeola	Associate Professor	B. Eng., M.Eng., Ph.D. (Ilorin); R.Eng. (Nigeria)	Water Resources
22	A. W. Salami	Professor	B. Eng., M. Eng., (Minna), Ph.D. (Ilorin) 2007, MNSE; PGD Computer Sci., AMICE, R. Engr. (COREN)	Water Resources
23	A. M. Ayanshola	Professor	N.D., (Bida), B. Eng., (Minna), M.Eng, Ph.D. (Ilorin), MNSE, R.Engr. (COREN)	Water Resources
24	O. O. Olofintoye	Reader	B.Eng., M.Eng. (Ilorin), Ph.D. (Durban) 2015. R.Engr. (COREN)	Water Resources
25	O. A. Mokuolu	Reader	B.Eng. M.Eng, (Ilorin). Ph.D. (Ibadan) 2014. R.Engr. (COREN)	Water Resources
26	Y. L. Shuaib Babata	Professor	BEng, MSc, (Ilorin); Ph.D. (MINNA); R.Eng. (Nigeria)	Casting technology, Corrosion, Materials Characterization, Manufacturing, Design and Fabrication
27.	M. S. Sanusi	Senior Lecturer	BTech (Ogbomoso), MSc, Ph.D. (Ibadan)	Food Engineering and Product Development
28.	K. O. Yusuf	Professor	BEng (Minna); MEng (Ilorin), Ph.D. (Ilorin); R.Eng. (Nigeria)	Soil and Water Engineering
29.	T. A. Ishola	Reader	BEng, MEng, (Ilorin); Ph. D. (UPM); R.Eng. (Nigeria)	Food Machine Design and Automation
30.	E. O. Ajala	Reader	BTech, (Ogbomoso), MSc. (Ife), Ph.D. (Minna); R.Eng. (Nigeria)	Biochemical Engineering
31.	J. A. Adeniran	Reader	BTech (Ogbomoso); MSc (Lagos); Ph.D. (Ogbomoso); R.Eng. (Nigeria)	Environmental Engineering, Climate Change
32	A. G. Adeniyi	Reader	BTech, MTech, Ph.D. (Ogbomoso); R.Eng. (Nigeria)	Process System Engineering, Process and Product Development
33	A. I. Abdullateef	Reader	BEng, (OSUA); MEng. (BENIN); Ph.D. (IIUM, Malaysia); R.Eng. (Nigeria)	Power Engineering
34	O. S. Zakariyya	Senior Lecturer	B.Eng (Zaira); MSc (EMU, Famagusta, Cyprus); PhD (Zaira); R.Eng. (Nigeria)	Digital Image Processing
35	H. U. Hambali	Senior Lecturer	BEng (Maiduguri); MSc (Zaria); Ph.D. (UTM, Johor Bahru); R.Eng. (Nigeria)	Catalysis of Petrochemicals production and Wastewater

				treatment
36	Mary A. Ajala	Senior Lecturer	BTech; MTech; (Ogbomoso); Ph.D. (Minna); R.Eng. (Nigeria)	Environmental Engi neering
37.	M. O. Iyanda	Senior Lecturer	BEng, MEng, Ph.D. (Ilorin); R.Eng. (Nigeria)	Farm Power
38.	A. B. Rabiu	Senior Lecturer	B.Eng (Kano), MEng, Ph.D. (Ilorin); R.Eng. (Nigeria)	Thermo-fluids Engineering
39.	O. T. Popoola	Senior Lecturer	B.Eng (Kano), MEng, Ph.D. (Ilorin); R.Eng. (Nigeria)	Thermo-fluids Engineering and Computational Fluid Dynamics
40.	Zainab T. Yaqub	Lecturer I	BSc, (Lagos); MTech, (Johannesburg); Ph.D. (Johannesburg); R.Eng. (Nigeria)	Biochemical Engineering
42	M.A. Amoloye	Lecturer I	BEng (Bauchi); MTech (Ogbomoso); Ph.D. (Ilorin); R.Eng. (Nigeria)	Process System Engineering, Process and Product Development
43	I. N. Aremu	Lecturer I	MSc, (Ukraine); R.Eng. (Nigeria)	Iron and Steel Making, Materials Characterization
Technical staff of the department				
1	M. O. Sayi	Principal Chief Technologist	ND, HND (Civil), PGD, R. Eng. COREN (Nigeria)	Structures and Structural materials
2	Mrs. S. I. Adio-Yusuf	Principal Chief Technologist	ND , HND (Civil); COREN Regd.(Nigeria)	Water Resource
3	K. A. Yusuf	Chief Technologist	ND, HND (Civil), PGD, R. Eng. COREN (Nigeria)	Structural materials
4	Mr. O. E. Eruotor	Chief Technologist	ND, HND, PGD, MSc.(Civil), COREN Regd.(Nigeria)	Water Resource
5	S. Alasinrin	Assistant Chief Technologist	ND, HND (Civil), PGD, R. Eng. COREN (Nigeria)	Surveying and Geoinformatics
6	E. K. Badmus	Laboratory Superintende nt	ND, HND (Civil)	Structural materials
7	O. O. Olawuyi	Laboratory Superintend ent	NABTEB; GCE; Basic Tech Cert. (NIST); OND (NIST).	Geotechnics
8	Mr. S. N. Mohammed	Technologist II	ND, HND (Civil)	Structures
9	T. I. Hassan	Laboratory Assistant	NABTEB	Geotechnics
10	Mr. J. D. Suleiman	Senior Laboratory Assistant	NECO, Trade Test Certificate (One and Two)	Geotechnics

Administrative Staff				
1	Obans	Chief Sec. Assistant	NECO, Diploma (Human Kinetics); Computer training Cert.;CSE Cert.50WPM;	Registry Staff
2	Mubaraq Mustapha Toyin	Higher Executive Officer	HND Public Administration	Registry Staff
3	Fatima Yusuf	Caretaker	SSCE	Registry Staff

Academic Staffs for Non Departmental Courses

S/N	Name of Lecturer	Course and Course Code	Source Department
1	Prof H.A Ajimotokan	GET 208 - Strength of Materials	Mechanical Engineering
2	Dr. S. I. Mustapha Dr. Zainab T. Yaqub Engr. I. A. Tijani	GET 206 - Fundamentals of Engineering Thermodynamics	Chemical Engineering
3	Prof. E. O. Oke Dr. Mary A. Ajala Dr. I. E. Muhibuddin	GET 210 - Engineering Mathematics II	Chemical Engineering
5	Dr. Olayanju Engr. Abdullateef	EEE 202 - Applied Electricity II	Electrical Engineering
4	Dr M.M Odewole	ABE 306 - Engineering Economics	Agric. And Biosystem Engineering
6	Dr. Outoze	MEE 362 Engineering Mathematics 4	Mechanical Engineering
7	Dr Ismail Adua Mustapha	BUL506- Engineering Law	Faculty of Law

B.Eng. Civil Engineering

Overview

Civil engineers plan, design and supervise construction of many essential facilities and structures such as bridges, dams, roads, buildings, ports, etc. Included in the study of civil engineering are courses in water resources and environmental engineering that are directly related to the solution of hazardous waste and pollution problems, providing potable and economical water supply systems, and maintaining a safe environment.

Philosophy

The Bachelor of Engineering and Technology B.Eng/B.Tech degree programme in Civil Engineering is based on the philosophy that the rate at which a nation progresses technologically is determined to a great extent by the size, quality, motivation and orientation of its science and engineering workforce. The programme should, thus, seek to train civil engineers who can best contribute to national development. For this, they must be equipped with the tools to understand, analyse, design and construct and maintain all possible physical facilities that can possibly promote appropriate development by conceiving and adapting techniques, processes and materials as necessary.

In consequence of the above, the programme is structured in such a way that students will have opportunity to take courses that will provide a basic understanding of all areas of civil engineering practice.

Objectives

The objectives of the Civil Engineering programme is to train civil engineers who are equipped with a broad-based experience ranging from engineering analysis and design to laboratory testing and experimentation in all areas of Civil Engineering with further concentration in the later years on, at least, several of the specialities. They would be equipped with:

1. A good grounding in basic engineering courses;
2. A good grasp of the essential application and utility courses;
3. A thorough understanding of the experimental and practical bases for the relevant theoretical engineering principles;
4. A good knowledge of all the various branches of civil engineering with further specialisation;
5. Construction engineering and management skills (combining engineering and management skills to complete construction projects designed by other engineers and architects);
6. Geotechnical engineering skills (analysis of soils and rock in support of engineering projects/applications - building foundations, earthen structures, underground facilities, dams, tunnels, roads.);
7. Structural engineering skills (design of all types of stationary structures - buildings, bridges, dams);
8. Surveying skills (measure/map the earth's surface in support of engineering design and construction projects and for legal purposes - locating property lines.);
9. Transportation engineering skills (design of all types of transportation facilities/systems – streets/highways, airports, railroads, other mass transit, harbours/ports);

10. Water resource skills (control and use of water, focusing on flood control, irrigation, raw water supply, and hydroelectric power applications);
11. Environmental engineering (air pollution control, hazardous waste treatment and disposal, recycling and solid waste disposal, sanitary engineering (municipal and industrial water and wastewater treatment);
12. Substantial practical skills for tackling real life engineering problems; and
13. Knowledge of entrepreneurial and management principles upon which enterprising professional careers can be built.

Employability Skills

1. Ability to apply scientific and engineering principles to plan, design and supervise civil engineering projects;
2. Skills to convey technical material persuasively to clients, colleagues and subordinates;
3. Knowledge of contemporary issues and ability to keep up with emerging technologies relevant to executing civil engineering projects; and
4. Capacity to utilise the skills acquired in government (including regulatory and executing agencies), industry (including consulting, construction organisations) and academia.

21st Century Skills

The 21st century skills includes the innovative skills:

1. Creativity and innovation;
2. Critical thinking/problem solving/decision making;
3. Communication;
4. Collaboration (team work);
5. Learning to learn/metacognition;
6. Citizenship 9local and global);
7. General computer literacy and mastery of relevant information technology;

Unique Features of the Programme

1. Sound exposure to all areas of civil engineering, including environmental engineering;
2. Good exposure to allied areas such as law, economics and management;
3. Familiarity with general knowledge, including philosophy, entrepreneurial skills and history;
4. Ability to communicate ideas effectively using modern tools involving computers, internet and telecommunication; and
5. Capacity of graduates to establish their own businesses and go into paid employment with government or in industry; or pursue further studies.

Admission and Graduation
Requirements Admission
Requirements

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

1. Unified Tertiary Matriculation Examination (UTME) Mode (5 Year Degree Programme)
2. Direct Entry (DE) Mode (4 Year Degree Programme)

Unified Tertiary Matriculation Examination (UTME) Mode

For the five-year degree programme, in addition to acceptable passes in the Unified

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

Direct Entry (DE) Mode

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

Graduation Requirements

The 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. HND holders who enter the degree programme at 300 level should register for a minimum of 90 units of courses and a maximum of 120 units of courses.
5. The minimum and maximum credit load per semester is 15 and 24 credit units respectively.
6. 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 1.00.
7. A student shall also have earned the 15 credit units of Students Industrial Work Experience Scheme (SIWES), 8 credit units of University General Study courses and four credit units of Entrepreneurship courses.

For the purpose of calculating a student's cumulative grade point average (CGPA) in order to determine the class of Degree to be awarded, grades obtained in ALL the courses registered, whether compulsory or optional and whether passed or failed must be included in the computation. Even when a student repeats the same course once or more before passing it or substitutes another course for a failed optional course, grades scored at each and all attempts shall be included in the computation of the GPA.

Prerequisite courses must be taken and passed before a particular course at a higher level. Furthermore, if a student fails to graduate at the end of a normal

academic session, he or she would not be allowed to exceed a total of 15 semesters in the case of students admitted through UTME and 13 semesters in the case of Direct Entry students who entered at 200Level and 11 semesters in the case of students who entered at 300Level.

Global Course Structure

Level	GST/ENT	Basic Science	Discipline/ GET	Programme (CEE)	SIWES*	Total Units
100L	4	16	3	2	-	25
200L	4	-	24	2	3	33
300L	4	-	18	7	4	33
400L	-	-	2	3	6	11
500L	-	-	5	9	-	14
Total	**12**	**16**	**52**	**23**	**13***	**105**

*Not included in Total 105 units of 70% NUC CCMAS Component

100 Level

Course Code	Course Title	Units	Status	LH	PH
GST 111	Communication in English	2	C	15	45
GST 112	Nigerian Peoples and Culture	2	C	30	-
CHM 101	General Chemistry I	2	C	30	
CHM 102	General Chemistry II	2	C	30	-
CHM 107	General Practical Chemistry I	1	C	-	45
CHM 108	General Practical Chemistry II	1	C	-	45
GET 101	Engineer in Society	1	C	15	-
GET 102	Engineering Graphics and Solid Modelling I	2	C	15	45
MTH 101	Elementary Mathematics I	2	C	30	-
MTH 102	Elementary Mathematics II	2	C	30	-
*MTH 103	Elementary Mathematics III	2	C	30	-
PHY 101	General Physics I	2	C	30	-
*PHY 102	General Physics II	2	C	30	-
PHY 103	General Physics III	2	C	30	-
*PHY 104	General Physics IV	2	C	30	-
PHY 107	General Practical Physics I	1	C	-	45
PHY 108	General Practical Physics II	1	C	-	45
*STA 112	Probability I	3	C	45	-
CEE101	Introduction to Civil Engineering	2	C	15	
Total		**34**			

* Elective (not added to CCMAS units)

200 Level -

Course Code	Course Title	Units	Status	LH	PH
GST 212	Philosophy, Logic and Human Existence	2	C	30	-
ENT 211	Entrepreneurship and Innovation	2	C	30	-
GET 201	Applied Electricity I	3	C	45	-
GET 202	Engineering Materials	3	C	45	
*GET 203	Engineering Graphics and Solid Modelling	2	C	15	90
GET 204	Students Workshop Practice	2	C	15	45
GET 205	Fundamentals of Fluid Mechanics	3	C	45	-
GET 206	Fundamentals of Thermodynamics	3	C	45	-
*GET 207	Applied Mechanics	3	C	30	
GET 208	Strength of Materials	3	C	45	-
GET 209	Engineering Mathematics I	3	C	45	-
GET 210	Engineering Mathematics II	3	C	45	-
GET 211	Computing and Software Engineering	3	C	30	45
CEE 201	Civil Engineering Drawing	2	C	15	45
EEE 202	Applied Electricity II	3	C	45	
*UIL-CEE 278	Elements of Architecture	2	C	30	
**GET 299	SIWES I: Students Work Experience Scheme	3	C	9 Weeks	
Total		**44**			

* Elective (not added to CCMAS units)

** All SIWES units credited in the 2nd Semester of 400 Level

300 Level

Course Code	Course Title	Units	Status	LH	PH
ENT 312	Venture Creation	2	C	15	30
GST 312	Peace and Conflict Resolution	2	C	30	-
GET 301	Engineering Mathematics III	3	C	45	-
GET 302	Engineering Mathematics IV	3	C	45	-
GET 304	Engineering Communication, Technical Writing and Presentation	3	C	45	-
GET 305	Engineering Statistics and Data Analytics	3	C	45	-
GET 306	Renewable Energy Systems and Technology	3	C		
GET 307	Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies	3	C	45	-

*GET 311	Engineering Economics	3	C	45	-
CEE 301	Fluid Mechanics	3	C	30	45
CEE 302	Strength of Structural Materials	2	C	30	-
CEE 303	Engineering Geology	2	E	15	45
CEE 304	Civil Engineering materials	3	E	30	45
CEE 305	Soil Mechanics I	3	C	30	45
CEE 307	Structural Mechanics I	2	2	30	-
CEE 308	Engineering Surveying and Photogrammetry I	2	C	15	45
+UIL-GEM 217	Principles of Stratigraphy	1	C	30	-
CEE 306	Design of Structures I	2	C	30	-
*UIL-CEE 366	Structural Analysis II	2	C	30	-
+UIL-CEE 334	Hydraulics	3	C	45	-
*UIL-CEE 383	Civil Engineering Lab course I	1	C	-	45
**GET 399	SIWES II: Students Work Experience Scheme	4	C	12 Weeks	
Total		**52**			

* Elective (not added to CCMAS units)

** All SIWES units credited in the 2nd Semester of 400 Level

+ Further addition after 30 %

400 Level

Course Code	Course Title	Units	Status	LH	PH
GET 402	Engineering Project I	2	C		90
GET 404	Engineering Valuation and Costing	2	C	30	
CEE 406	Engineering Surveying and Photo-grammetry II	3	C	30	45
+UIL-ELE 312	Measurement and Instrumentation	3	C	45	-
*UIL-CEE 421	Applied Soil Mechanics and Foundation	3	C	45	-
*UIL-CEE 463	Structural Analysis III	3	C	45	-
*UIL-CEE 465	Structural Design II	3	C	45	-
*UIL-CEE 473	Transportation Engineering I	2	C	30	-
*UIL-CEE 481	Civil Engineering Laboratory Course II	1	C	-	45
*UIL-CEE 485	Civil Engineering Practice	2	C	30	-

+UIL-CEE 412	Environmental Engineering	3	C	45	-
+UIL-CEE 434	Engineering Hydrology	2	C	30	-
**GET 499	SIWES III	4	C	12 Weeks	
Total		33			

* Elective (not added to CCMAS units)

** All SIWES units credited in the 2nd Semester of 400 Level

+ Further addition after 30 %

SIWES courses and Engineering valuation*

Course Code	Course Title	Units	Status	LH	PH
GET 299	SIWES I	3	C	9 weeks	
GET 399	SIWES II	4	C	12 weeks	
GET 499	SIWES III	4	C	12 weeks	
GET 404	Engineering Valuation	2	C	6 weeks	
	Total	**13***			

* All credited in the 2nd Semester of 400-Level

500 Level

Course Code	Course Title	Units	Status	LH	PH
GET 501	Engineering Project Management	3	C	45	-
GET 502	Engineering Law	2	C	30	-
CEE 506	Construction Engineering	3	C	30	45
CEE 599	Project	6	C	-	270
*UIL-CEE 565	Structural Analysis IV	2	C	30	-
*UIL-CEE 575	Transportation Engineering II	2	C	30	-
+UIL-CEE 531	Hydraulic Engineering	2	C	30	-
*UIL-CEE 524	Geotechnical Engineering	2	C	30	-
*UIL-CEE 562	Design of Structures I	2	C	30	-
*UIL-CEE 582	Civil Engineering Services	2	C	30	-
*UIL-CEE 584	Computer Application in Engineering	2	C	30	-
*UIL-CEE 535	Environmental Engineering Analysis and Design	3	E	45	-
*UIL-CEE 536	Water Resources Engineering	3	E	45	-
*UIL-CEE 567	Advanced Structural Analysis & Design I	3	E	45	-
* UIL-CEE 568	Advanced Structural Analysis & Design II	3	E	45	-
*UIL-CEE 577	Transportation Systems Analysis and Design I	3	E	45	-

*UIL-CEE 578	Transportation System Analysis & Design II	3	E	45	-
*UIL-CEE 585	Advanced Geotechnical Engineering I	3	E	45	-
* UIL-CEE 586	Advanced Geotechnical Engineering II	3	E	45	-
Total		**52**			

* Elective (not added to CCMAS units)
Each student must offer at least two (2) elective courses

Course Contents and Learning Outcomes

100 Level

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, generalisation 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 Cultures (2 Units C: LH 30)

Learning Outcomes
At the end of this course, students should be able to:
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; 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.

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. Hybridisation 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 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

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

1. State the general laboratory rules and safety procedures;
2. Collect scientific data and correct carry out chemical experiments;
3. Identify the basic glassware and equipment in the laboratory;
4. State the differences between primary and secondary standards;
5. Perform redox titration;
6. Record observations and measurements in the laboratory notebooks; and
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

At the end of this course, the students should be able to:
1. State the general laboratory rules and safety procedures;
2. Collect scientific data and correctly carry out chemical experiments;
3. Identify the basic glassware and equipment in the laboratory;
4. Identify and carry out preliminary tests which include ignition, boiling point, melting point, test on known and unknown organic compounds;
5. Carry out solubility tests on known and unknown organic compounds;
6. Carry out elemental tests on known and unknown compounds; and
7. Carry out 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-Moiré'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)
(Pre-requisite –MTH 101) (2 Units C: LH 30)

Learning Outcomes

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

1. Solve some vectors in addition and multiplication;
2. Calculate force and momentum; and
3. Solve differentiation and integration of vectors.

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 (General Physics II (Electricity and Magnetism)
(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; Bernoullis equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

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; Bernoullis equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 104 General Physics IV (2 Unit C: LH 30)

Learning Outcomes
On completion, the 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, polarisation. 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. (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.

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 Solid Modelling I (2 Units C: LH 15; PH 45)

Learning Outcomes

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

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. 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;
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. Visualisation 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.

STA 112 Probability I (3 Units C: PH 45)

Learning Outcomes

On completion, the students should be able to:
At the end 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 of 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.

CEE 101: Introduction to Civil Engineering (1 Unit C: LH 15)

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.

200 Level

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.

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.

GET 201: Applied Electricity I (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. Toughing 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 Modelling II (3 Units C: LH 15; PH 90)

Learning Outcomes

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 multi-physical, 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. 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 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, etc;
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

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

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; composite members, stress-strain relation. Generalised Hooke's law. Stresses and strains due to loading and temperature changes. Torsion of circular members. Shear force, bending moments and bending stresses in beams with symmetrical and combined loadings. Stress and strain transformation equations and 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 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 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.

EEE 202: Applied Electricity II (3 Units C: LH 45)

Learning Outcomes:

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

1. Differentiate between various DC and AC 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 to TV, Radio and Telephone systems.

UIL-CEE 278 Element of Architecture (2 units, C: LH= 30)

Senate – approved relevance

Graduates are produced who will be well qualified to operate and develop the public services, initiate and carry out engineering design and pursue developmental research which is in line with University of Ilorin mission. This course provides engineering graduates who are highly skilled in the design and analysis of structures, evaluation, planning and creative design abilities in various ways that can contribute to the development of a more satisfying life and environment for the benefit of mankind, in Nigeria and the world at large.

Overview

This course deals generally with the elements and principles of architectural design coupled with some of the software used for both architectural design and structural detailing that will aid the students in design studies. The knowledge of Engineering Graphics and solid modeling is required in this course.

Architecture, which is the "art of building" has its own language. In order to learn architecture, the students have to learn its letters, its vocabulary (or basic elements) and the grammar (composition principles) that brings them together. Once these fundamental components are learn, the students can read and write good architectural designs. This course will introduce the students to the basic elements of form and space and shows how they are manipulated and organized in the development of a design concept using any of the architectural design software(s). The knowledge the students will acquire from the course will be useful in designing Civil Engineering infrastructures that will be a great boast in terms of infrastructural development in Nigeria as emerging nations.

Objectives

The objectives of the course are:

1. Describe the term "architecture", its fundamentals and scope;
2. Describe the concept of dimensioning, its elements and rules as applied to different drawings;
3. Relate graphical communication concept with architecture;
4. Outline six (6) importance of freehand, oblique and isometric sketching;
5. Describe design elements differences read architectural drawing;
6. Explain building sections;
7. Describe building components in a drawing;
8. Reproduce architectural drawings and structural detailing of structural plans using autocad, revit and archicad software;
9. Describe the direction of rafters in architectural drawings; and
10. Explain rendering in architecture.

Learning outcomes

At the end of the course, the students should:

1. explain the term "architecture", its fundamentals and scope;

2. illustrate the concept of dimensioning, its elements and rules as applied to different drawings;
3. discuss graphical communication concept with architecture;
4. outline six (6) importance of Freehand, Oblique and isometric sketching;
5. describe six (6) design elements differences on how to read architectural drawing;
6. explain building sections;
7. identify five (5) building components in a drawing;
8. reproduce architectural drawing and structural detailing of structural plans using AUTOCAD, REVIT and ArchiCAD software;
9. explain the direction of rafters in architectural drawings; and
10. apply rendering to architectural 3D drawings.

Course content

Introduction–Dimensional awareness. Graphical communication. Relation to environments. Freehand drawing– form in terms of shades, light shadow. Common curves. Orthographics drawing. Lettering. Dimetrics. Perspective projections. Applications of elementary designs. Oblique. Isometric. Fundamentals of Architecture. Introduction to 2D design. Basic element of planning. Architectural graphics. Building components. Building Climatology.

GET 299: 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 centres 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).

NOTE: **Each programme to indicate additional details of programme-specific activities for their students.**

300 Level

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.

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, unutilised 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).

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. 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;
2. Develop simple algorithms and use computational proficiency;
3. Write simple proofs for theorems and their applications; and
4. 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: Technical Writing and Communication (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 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 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 and percentiles. Probability. Binomial, Poisson hyper-geometric and normal distributions. 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 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. Appreciate the environmental impact of energy exploitation and utilization, and pursue the sustainable development of renewable energy for various applications; and
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.

GET 399: 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 trouble- shooting, 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. Basics 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.

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 E: 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 304: Civil Engineering Materials (3 Units E: 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 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, 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.

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 E: LH 45)

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 E: LH15; PH45)

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 311: Engineering Economics (3 Units; Compulsory; LH=45)

Senate Approved Relevance
The versatility of graduates of engineering in a rapidly changing global workspace is a core principle in the vision and mission of the University of Ilorin. This course provides engineering graduates with the requisite knowledge of the relevant principles of engineering economics so that they can be better managers, in addition to their technical competence.

Course Overview
This course introduces students to the fundamental principles and basic concepts of engineering economics as they relate to potential investment opportunities and their profitability by considering the time value of money. The peculiarity of the engineering economy with respect to various economic concepts are highlighted in the course.

Engineering economics as a course will equip students with overview knowledge of the relevant principles and basic concepts of engineering economics, engineering economic decisions, interest formulae and economic equivalence, and standard cash flows; among others. Also, it will equip students with the ability to apply the fundamentals and principles of economic evaluation and comparison of alternatives.

Objectives
The objectives of this course are to:

1. Identify and describe the nature and types of engineering economic decisions;
2. Differentiate between engineering economic decisions and design decisions;
3. Identify and briefly explain the fundamental principles of engineering economics;
4. Explain the meaning of economic equivalence and why its required in economic analysis;
5. Explain the concept of interest operation;
6. Identify and explain the types of interest formulae used to facilitate their calculations of economic equivalence;
7. Identify, analyse and discuss the economic analysis of various types of interest formulae used to facilitate their calculations of economic equivalence;
8. Explain the term depreciation;
9. Identify and describe the depreciation methods;
10. Outline and discuss the effects of depreciation on net income calculation; and
11. Evaluate the potential investment opportunities and their profitability by considering the time value of money and compare mutually exclusive investment opportunities.

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

1. Outline the nature engineering economic decisions and describe at least four types of engineering economic decisions;
2. Differentiate between engineering economic decisions and design decisions;
3. Describe the fundamental principles of engineering economics and briefly explain at least three fundamental principles of engineering economics;
4. Explain the meaning of economic equivalence and why its required in economic analysis;
5. Explain the concept of interest operation;
6. Explain the two types of interest formulae used to facilitate their calculations of economic equivalence;
7. Implement the economic analysis of various types of interest formulae used to facilitate their calculations of economic

equivalence;
8. Define the term depreciation;
9. Analyze the depreciation methods and describe at least two depreciation methods;
10. Appraise the effects of depreciation on net income calculation; and
11. Evaluate the potential investment opportunities and their profitability by considering the time value of money and compare mutually exclusive investment opportunities.

Course Contents

Definition, nature and scope of Engineering Economics. Basic Concepts of Engineering Economy. The Decision-Making Process. Engineering Economic Decisions. Engineering Economic Decisions versus Engineering Design Decisions. Role of Engineers in decision making. Break- even analysis. Time-value of money. Cash flow diagram. Economic Equivalence. Simple interest. Compound interest. Compound interest formulas and factors (P/F, F/A, A/P, P/A, F/A, A/F, A/G, G/A). Evaluation of a single proposal using PW, FW, AW, IRR and payback period analyses. Decision making among alternative proposals with equal and unequal service lives using PW, FW, AW, IRR and payback period analyses. Life-cycle costing. Depreciation – definition, purpose of, methods (straight-line, sum-of the-years-digits, declining balance). The trade-off between Risk and Reward. Effect of tax and inflation in economic analysis.

Minimum Academic Standards: As specified in the NUC 70% CCMAS requirement

UIL-CEE 366: **Structural Analysis II** **(2 Units C: LH 30)**

Senate-approved relevance

To respond to worldwide demand for engineers that have a sound knowledge of engineering and analysis principles with the ability to apply this knowledge to complex situations prevailing within construction and manufacturing industries. This is in line with University of Ilorin mission. Our graduates will be a role model, self-reliant and excellence civil engineers with adequate technical skills and fundamental concepts relevant to sustainable development.

Overview

This course is focused on the advance methods (theorems) for the analysis of indeterminate structures. Clearly it is important to avoid deformations so large that they may prevent the structure from fulfilling the purpose for which it is intended.

Analysis of deformations may also help us in the determination of stresses. It is not always possible to determine the forces in the members of a structure by applying only the principle of statics. This is because statics is based on the assumption of un-deformable, rigid structures.

Objectives

The objectives of the course are:

1. Perform analysis of indeterminate structures slope-deflection methods;
2. Describe three (3) structure supports such as fixed end moment (fem) and bending moment analysis for a statically indeterminate structures using moment distribution methods;
3. Apply strain energy and virtual work principles in the analysis of indeterminate structures;

4. Outline the influence line coefficients and other structural parameters in beams using influence line theorems;
5. Explain the second theorem of castigliano on least work theorem and its applications in different structural elemental analysis;
6. Introduce the elastic structural instability and simple plastic theory of bending collapse loads;
7. Explain the influence line diagrams for the reactions at the supports of a beam;
8. Differentiate influence lines for shear, bending moment, deflection and slope at any point on the beam;
9. Illustrate the proof of the castigliano's theorem; and
10. Identify classical methods of analysis.

Learning outcomes

At the end of the course, the students should:

1. Outline four (4) basic procedures and formulation techniques of beam to achieve structural response using slope deflection method;
2. Derive the slope deflection method equations using mechanics and mathematics;
3. Describe the concept of fixed-end moments;
4. Compute stiffness factors, distribution factors, balance moment and carry-over moment for various members in a continuous beam using the moment distribution method;
5. Perform analysis of a continuous beam using the moment-distribution method;
6. Derive the influence lines for moving loads on trusses and beams;
7. Draw the influence line diagrams for the reactions at the supports of a beam;.
8. Construct influence lines for shear, bending moment, deflection and slope at any point on the beam;
9. Discuss and solve three (3) problems associated with first and second theorem of castigliano;
10. Determine the reactions and drawing the bending moment diagram for a simply supported beam, propped cantilever and fixed supported beam using the least work theorem; and
11. Solve simple elastic structural instability and simple plastic theory of bending collapse loads.

Course content

Theory and problems in determinate structure. Static and kinematics indeterminacy. Classical methods of analysis. Virtual work and energy methods. Slope deflection method. Moment distribution method. Clapyreon method. Carryover method. Influence line for statically indeterminate structures. Theory and problems in determinate structure. Structural characteristics of beams and frames. Review of beam theory and relationship between load. Shear and moment using classical method. Classify determinate and indeterminate beam. Classify determinate and indeterminate frame structures. Degree of indeterminacy. Approximate analysis of building frames.

UIL-CEE 383: Civil Engineering Lab Course I (1 Unit C: PH=45)

Senate approved relevance

Producing graduates who will be well qualified to operate and develop the public services, initiate and carry out engineering experiments, pursue developmental research as stated in University of Ilorin mission. This course provides engineering graduates with the requisite knowledge of the relevant principles of civil engineering laboratory so that they can be better experimentalists in addition to their technical competence.

Overview

Civil engineering laboratory course is a course which will equip students with overview knowledge of the relevant principles and basic concepts of engineering in conducting laboratory assessment, data collection and analysis of collected data.

Also, it will introduce and equip students with the ability to use the equipments effectively to generate valuable data for engineering consumption.

Objectives

The objectives of this course are:

1. Describe eight (8) general laboratory rules and safety procedures;
2. Appraise technical data and correctly carrying out experiments;
3. Identify ten (10) basic equipments in the laboratory;
4. Identify two (2) differences between primary and secondary standards;
5. Implements sieve analysis;
6. Explain how measurements can be taken in the laboratory;
7. Identify the possible errors associated with experiments
8. Analyse measurements of some physical quantities;
9. Arrange observations of events; and
10. Interpret collected and tabulated data.

Learning outcomes

At the end of this course, students should:

1. Describe five (5) general laboratory rules and safety procedures;
2. Use technical data and correctly carrying out of experiments;
3. Identify the basic equipment in the laboratory;
4. Identify four (4) differences between primary and secondary standards;
5. Implement sieve analysis;
6. Record observations and measurements in the laboratory notebooks;
7. Compare or identify possible errors associated with experiments
8. Analyse measurements of some physical quantities;
9. Generate observations of events, collect and tabulate data;
10. Analyse graphs; and
11. Draw conclusions and submit report from numerical and graphical analysis of data.

Course content

Sieve analysis. Atterberg Limit test. Specific gravity test. Water absorption Capacity test. Abrasion test. CBR test. Aggregate test. Permeability test. Soundness test. Cement setting time test. Plasticity test. Dry density test. Wet density test. Compaction test. Compressive strength test. Tensile strength test. Hydraulic test. Slump test. Void ratio. Porosity. Liquid limit. Plastic limit.

UIL-CEE 334: Hydraulics (3 Unit C: LH=45)

Learning Outcomes
At the end of this course, the students should be able to:
1. explain in detail the concept of the hydrologic cycle and compute components of the hydrologic cycle;
2. estimate and analyse the hydrograph;
3. discuss the basics of flood routing and unsteady gradually varied flow;
4. analyse simple rapidly varied unsteady flow problems; conduct flood frequency analysis and flood routing; and
5. identify the fundamentals of groundwater occurrence and evaluate yields of aquifers.

Course Contents
Introduction: hydrologic cycle, precipitation, evaporation and transpiration. Quantitative
Hydrology: hydrography, volume runoff, storage routing. Groundwater: occurrence,
hydraulics, well, yield.

Open channels: hydraulics of open channel flow, culverts and bridges. Steady uniform flow.
Steady gradually varied flow. Hydraulic Jump. Surge Waves. Measurement of flow in open
channels.

400 Level

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; and
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 Appraisal (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; and
6. Determine price, cost, value, depreciation and obsolescence in real property, personal property, personal property, machinery and equipment, oil, gas, mines, and quarries valuation.

GET 499: 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 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 299, GET 399 and GET 499), on which a seminar will be presented to the Department for overall assessment.

CEE 406: Engineering Surveying and Photogrammetry II

(3 Units C: LH 30; 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.

UIL-CEE 421 Applied Soil Mechanics and Foundation [3 units, C: LH =45]
Senate – approved relevance

The versatility of graduates of engineering in a rapidly changing global workspace is a core principle in the vision and mission of the University of Ilorin. This course provides civil engineering graduates with requisite knowledge in mechanism behind soil formation, determination of soil strength capacity and means of selecting appropriate foundation for engineering structure.

This is necessary to produce excellent civil engineers with adequate technical skills, fundamental concepts relevant to latest development to handle structural issues in civil engineering with respect to soil mechanics. Proper knowledge of the soils (soil properties) used for construction and on which structures are built on is vital towards actualizing a safe and economical designs and construction in Nigeria and the globe in general.

Overview

The course is an introductory course in the science of soil mechanics (branch of science that deals with the study of the physical properties of soil and the behavior of soil masses subjected to various types of forces) and the art of Geotechnical Engineering. The aim of this course is to give knowledge and understanding of basic soil mechanics. This course includes several topics e.g., physical and mechanical properties of soils, weight – volume relationship, soil classification, flow through soils, soil compaction, etc.

The course deals with all occurrences that affect the response of soils in any way associated with the field of engineering. This course is important because it is vital to know the nature and the various factors that affect soils used for construction purpose, and on which constructions are being implemented on, this will reduce the issue of building collapse and other structures in Nigeria.

Objectives

The objectives of the course are :

1. Describe soil mechanics;
2. Describe five (5) types of foundation;
3. Identify and calculate the parameters needed for foundation calculations;
4. Relate the relationships that exist between physical characteristics and mechanical properties of soils;
5. Outline six (6) experimental measurements of the physical and mechanical soil

properties commonly used in engineering practice and demonstrate same in the laboratory;
6. Identify the criteria and schemes used in soil classification and demonstrate same on soil samples;
7. Describe soil compaction and its importance in civil engineering construction involving the application of soils;
8. Describe soil compaction and its application in civil engineering;
9. Identify four (4) strength properties of soil; and
10. Describe hydraulic properties of soils, capillarity and its significance, coupled with computations involving permeability of soils.

Learning Outcomes

On completion of the course, students should :
1. Explain soil mechanics;
2. Select the best type of foundation suitable for a job;
3. Calculate the parameters needed for foundation calculations;
4. Explain soil and its origin in relation to civil engineering;
5. Express the relationships that exist between physical characteristics and mechanical properties of soils;
6. Describe four (4) experimental measurements of the physical and mechanical soil properties commonly used in engineering practice and demonstrate some in the laboratory;
7. Discuss the criteria and schemes used in soil classification and demonstrate same on soil samples;
8. Explain soil compaction and its importance in civil engineering construction involving the application of soils;
9. Determine four (4) strength properties of soil; and
10. Discuss hydraulic properties of soils, capillarity and its significance, coupled with computations involving permeability of soils and ground water control;

Course content

Stress in soils, consolidation, compaction. CBR. Soil improvement. Stability of slopes. Earth pressure analysis. Bearing capacity. Settlement analysis of shallow and deep foundations. Design of footings. Design of retaining walls. Analysis and control of groundwater. Determination of specific gravity. void ratio. Porosity. Liquid limit. Plastic limit. Atterberg limits. Particle size distribution. Permeability. Soil classification, identification and physical properties. Soil survey. Soil map study.

UIL-CEE 463: **Structural Analysis III (3 Units: C; LH 45)**

Senate-approved relevance

To respond to worldwide demand for engineers that have a sound knowledge of engineering and analysis principles with the ability to apply this knowledge to complex situations prevailing within construction and manufacturing industries. This is in line with University of Ilorin mission. Our graduates will be a role model, self-reliant and excellence civil engineers with adequate technical skills and fundamental concepts relevant to sustainable development.

Overview

This course is focused on the advance methods (theorems) for the analysis of indeterminate structures. Clearly it is important to avoid deformations so large that they may prevent the structure from fulfilling the purpose for which it is intended.

Analysis of deformations may also help us in the determination of stresses. It is not

always possible to determine the forces in the members of a structure by applying only the principle of statics. This is because statics is based on the assumption of un-deformable, rigid structures.

Objectives

The objectives of the course are:

1. Perform analysis of indeterminate structures using matrix methods;
2. Describe three (3) structure supports such as fixed end moment (fem) and bending moment analysis for flexibility methods;
3. Apply strain energy and virtual work principles in the analysis of indeterminate structures;
4. Outline the influence line coefficients and other structural parameters in beams using influence line theorems;
5. Explain the second theorem of castigliano on least work theorem and its applications in different structural elemental analysis;
6. Introduce the elastic structural instability and simple plastic theory of bending collapse loads;
7. Explain the influence line diagrams for the reactions at the supports of a beam;
8. Differentiate influence lines for shear, bending moment, deflection and slope at any point on the beam;
9. Illustrate the proof of collapse load; and
10. Identify classical methods of analysis.

Learning outcomes

At the end of the course, the students should:

1. Outline four (4) basic procedures and formulation techniques of beam to achieve structural response using matrix method;
2. Derive the plastic theory equations using flexibility method;
3. Describe the concept of fixed-end moments;
4. Compute stiffness factors, distribution factors, balance moment and carry-over moment for various members in a continuous beam using the moment distribution method;
5. Perform analysis of a continuous beam using the moment-distribution method;
6. Derive the influence lines for moving loads on trusses and beams;
7. Draw the influence line diagrams for the reactions at the supports of a beam;
8. Construct influence lines for shear, bending moment, deflection and slope at any point on the beam;
9. Solve three (3) problems associated with collapse loads;
10. Determine the reactions and drawing the bending moment diagram for a simply supported beam, propped cantilever and fixed supported beam using the least work theorem; and
11. Solve simple Elastic structural instability and simple plastic theory of bending collapse loads.

Course content

Matrix methods of structural analysis, flexibility and stiffness methods. Elastic instability.

Introduction to plastic theory of bending. Collapse loads. Virtual work and energy methods. Slope deflection method. Moment distribution method. Clapyreon method. Carryover method. Influence line for statically indeterminate structures. Theory and problems in determinate structure. Structural characteristics of beams and frames. Review of beam theory and relationship between load. Shear and moment using classical method. Classify determinate and indeterminate beam. Classify determinate and indeterminate frame structures. Degree of indeterminacy. Approximate analysis of

building frames.

UIL-CEE 465: Structural Design II (3 Units C: LH 45)

Senate-approved relevance

Develop technical knowledge, training high quality graduates who are highly skilled and knowledgeable in the design and analysis of structures, evaluation, planning and creative design abilities in various ways that can contribute to the development of a more satisfying life and environment for the benefit of mankind as stated in University of Ilorin mission. This will help in mitigating the incidences of building collapse in our country.

Overview

Structural design is the methodical investigation of the stability, strength and rigidity of structure. The basic objective in structural analysis and design is to produce a structure capable of resisting applied loads without failure during its intended life. Clearly it is important to avoid deformations so large that they may prevent the structure from fulfilling the purpose for which it is intended. The structural design is based on the result of the analysis which helps to obtain the maximum bending moment. The structural design is performed to re-enforce the point at which the bending moment is maximum. This will be done with design code of practice (BS8110 or Eurocode) specifications using the established formulas to produce the required concrete cubic meters and re-enforcement bars to achieve structural stability. The goal of this course is to provide students with advanced knowledge of structural design which is design from Architectural drawing in the case of building structures and show its applications in other Civil Engineering structures such as dams, bridges, culverts, water retaining structures and retaining walls.etc.

Objectives

The specific objectives of this course are:

1. Explain the design philosophy in structural steel and wood design;
2. Explain five (5) advantages and disadvantages of steel over reinforce concrete;
3. Identify four (4) different grades of steel and their design strengths;
4. Identify and explain the limit state function in structural steel;
5. Apply the limit state function in the design of steel structures;
6. Identify compression and tension members in structural steel;
7. Execute the design of compression and tension members;
8. Sketch and detail all connections, base plates after design;
9. Analyze, design and detail of modern steel structures e.g ware house, bridges, silos; and
10. Prepare design for submission at the Urban and Regional Planning (URP) unit.

Learning outcomes

At the end of this course, the students should :

1. Explain the purpose and the design methods in structural steel;
2. Summarize the purpose of the use of steel over rc;
3. Compare and contrast the use of grade 43, 50 and 55 steel members;
4. Explain the elastic, plastic and limit state methods of design;
5. Apply the methods of design on compression and tension members;
6. Design universal h-section and i-section;
7. Design connections, frames and bases;
8. Evaluate structural steel design results and detailing;

9. Undertake design and detailing of structural steel members e.g ware house, roof top of buildings, silos; and
10. Arrange a documentation/report on designs of typical steel structure.

Course content:
Design philosophies for steel structure. Design philosophies for wood structures. Design of members subjected to tension. . Design of members subjected compression. Flexural Design of members. . Design of members subjected to shear. . Design of members subjected torsion. Design of members subjected to combined flexure/torsion/axial load. Design of bolt connections.
Introduction to prestressed concrete design. Design of hold down bolts. Design of plates connections. Design of truss members. Detailing of bolt. Stanchion detailing. Connection detailing. Purlin Detailing. Steel sections detailing.

UIL-CEE 473: Transportation Engineering I (2 Units C: LH 30)
Senate-approved relevance
Training of high-quality graduates who are highly skilled and knowledgeable in transportation engineering in Nigeria are in agreement with University of Ilorin's mission to address African developmental challenges in producing civil engineering graduates. Relevance is seen in civil engineers from University of Ilorin being able to design, construct and maintain highway to address the potholes and road failure issues, which result from inadequate and improper design and construction of highway. This will help to develop the community and the country at large.
Overview
Transportation engineering is a vital approach used to improve the road infrastructures in terms of quality of road construction for sustainable development in the country. Transportation engineering courses will help in mitigating the rate of traffic congestion and accident experiences in the country recently.
It also highlights the importance of road and possible ways to stabilize road, decongest traffic and ensure safety and durability of road. This can be achieved by conducing relevant soil test, design road alignment and intercepts.
Objectives

The objectives of the course are:

1. Explain various developmental stages in the road construction;
2. Outline five (5) importance of highway engineering in relation to socio-economic development of a country;
3. Perform soil tests and bore-hole ;
4. Explain compaction and effective compaction equipment's of the soil;
5. Study soil stabilization and various stabilization processes in roads;
6. Explain different factors controlling alignments, geometric plan elements, sight distances, design speed;
7. Explain horizontal alignment; simple circular and transition curves, super elevation and pavement widening in horizontal curves;
8. Explain vertical alignment; gradient limits, curves types, summit curves and valley curves.
9. Design the co-ordination of vertical and horizontal alignment, highway cross-section elements;
10. State different pavement types; (flexible, rigid and composite), pavement layers and their functions; and
11. Explain differences and similarities between flexible and rigid highway pavements.

Learning outcomes
At the completion of this course, students should:
1. Recognize at least four (4) different discoveries of early development, Tresaguet, Metcalf, Telford and macadam construction, modern development as stages of road development;
2. Appraise relevance of highway engineering in relation to socio-economic development of a country;
3. Produce soil tests for bore-hole construction;
4. Perform compaction tests and identify effective compaction equipment's and their applications;
5. Implement soil stabilization and discuss three (3) stabilization process in road construction;
6. Identify six (6) factors controlling alignments, geometric plan elements, sight distances, design speed in highway and transportation engineering;
7. Identify different curves types, summit curves and valley curves;
8. Design horizontal alignment, simple circular and transition curves, super elevation and pavement widening in horizontal curves;
9. Design vertical alignment and evaluate its gradient limits;
10. Differentiate the co-ordination of vertical and horizontal alignment;
11. Determine and draw the highway cross-section elements;
12. Obtain the cross slope and determine the actual capacity of road shoulders;
13. Illustrate different pavement types; (Flexible, rigid and composite), pavement layers and their functions; and
14. Evaluate the differences and similarities between flexible and rigid highway pavements in their design and construction;

Course content:
Definition of transportation engineering. Definition of components of transportation engineering. Types of transportation engineering. Types of components of fixed transportation facilities. Ride function of facilities. Effects of vehicle loads on road. Effect of water on performance of ride. Function of railways. Function of runways. Function of roads. Characteristics of highways materials. Improvement methods on highways. Traffic characteristics. Traffic application in geometric design. Soil stabilization. Testing of bituminous materials. consolidation, compaction. CBR. Soil improvement. Stability of slopes. Earth pressure.

UIL-CEE 481: Civil Engineering Lab Course II (1 Unit; C: PH=45)
Senate approved relevance
Producing graduates who will be well qualified to operate and develop the public services, initiate and carry out engineering experiments, pursue developmental research as stated in University of Ilorin mission. This course provides engineering graduates with the requisite knowledge of the relevant principles of civil engineering laboratory so that they can be better experimentalists in addition to their technical competence.

Overview
Civil engineering laboratory course is a course which will equip students with overview knowledge of the relevant principles and basic concepts of engineering in conducting laboratory assessment, data collection and analysis of collected data.

Also, it will introduce and equip students with the ability to use the equipment effectively to generate valuable data for engineering consumption.

Objectives
The objectives of this course are:
1. Describe the general laboratory rules and safety procedures;
2. Collect technical data and correctly carrying out experiments;
3. Identify the basic equipment in the laboratory;
4. Identify the differences between primary and secondary standards;
5. Perform sieve analysis;
6. Explain how measurements can be taken in the laboratory;
7. Outline the possible errors associated with experiments;
8. Implement measurements of some physical quantities;
9. Relate observations of events; and
10. Analyse collected and tabulated data.

Learning outcomes

At the end of this course, students should:

1. Describe The General Laboratory Rules And Safety Procedures;
2. Use Technical Data And Correctly Carrying Out Of Experiments;
3. Identify The Basic Equipment In The Laboratory;
4. Identify The Differences Between Primary And Secondary Standards;
5. Implement Sieve Analysis;
6. Record Observations And Measurements In The Laboratory Notebooks;
7. Identify Possible Errors Associated With Experiments;
8. Implement Measurements Of Some Physical Quantities;
9. Implement Observations Of Events, Collect And Tabulate Data;
10. Plot And Analyse Graphs; And
11. Draw Conclusions And submit report from numerical and graphical analysis of data.

Course content
Stress in soils, consolidation, compaction. CBR. Soil improvement. Stability of slopes. Earth pressure analysis. Bearing capacity. Settlement analysis of shallow and deep foundations. Design of footings. Design of retaining walls. Analysis and control of groundwater. Determination of specific gravity. void ratio. Porosity. Liquid limit. Plastic limit. Atterberg limits. Particle size distribution. Permeability. Soil classification, identification and physical properties. Soil survey. Soil map study.

UIL-CEE 485 Civil Engineering Practice [2 unit, C: LH 30]

Senate-approved relevance
This course will help to develop knowledge, skills including transferable skills, such as leadership, motivation, time management, prioritization, delegation, listening, communication, analytics and understanding, as well as awareness and "know how", in the fields of civil engineering and its related disciplines so that our graduates will be equipped to enter into self-employment and employment as professional engineers progressing on to Registered Engineer or (equivalent status) or a wide range of other professional careers. Our graduates will be professional engineers trained on leadership track and contract administration.
Overview
The practice of civil engineering is a profession which involves the designing and executing structural works that serve the general public, such as dams, bridges, aqueducts, canals, highways, power plants, sewerage systems, and other infrastructure.

In this course, the diverse aspects of civil engineering contract administration are examined and described, with relevant supporting examples. It starts by considering the general backcloth to civil engineering works and contracts, including funding, preliminary investigations and the preparation of engineer's reports. One of the major problems encountered in the operation of civil engineering contracts is a weakness in communication between the parties to the contract and site personnel. Vital communication requirements are described and illustrated, including the preparation of site documents and records and the purpose and conduct of site meetings. The method of measuring and valuing civil engineering works is explored and this encompasses the use of day work, issue of interim certificates, settlement of final accounts, valuation of variations and financial control of contracts.

Objectives

The specific objectives of this course are:

1. Explain the civil profession and its various sub-units;
2. Explain contract and three (3) types in civil engineering profession;
3. Evaluate the bureau of public procurement (bpp) in relation to civil engineering contract;
4. Appraise the civil engineering works and standard of measurement;
5. Evaluate bills of engineering measurement;
6. Define and discuss the roles of resident engineers, contractor;
7. Explain methods of valuation of work, interim certificate;
8. Compare the use of pert or cpm in contract administration;
9. Explain construction machinery and equipment.
10. Explain bidding procedures

Learning outcomes

At the end of this course, the students should:

1. Describe the civil engineering profession and its impact in the nation's infrastructure;
2. Identify and discuss simple and formal contract in civil engineering works;
3. Describe BPP and its application to civil engineering works;
4. Illustrate the use of BEME for large and small-scale works;

5. Apply BEME for large and small-scale contract;
6. Compare and contrast at least four (4) roles of a contractor, engineer, foreman in a given site;
7. Apply the daily work pay and monthly payment to any civil engineering contract;
8. Appraise the best option in choosing pert or cpm in project management;
9. Decide construction equipment required for a specific job and analyze their depreciation life; and
10 explain bidding procedures.

Course content

Legal professional and ethnical aspects of engineering contracts. Legal professional and ethnical aspects of engineering contract document including specifications and competitive bidding. Negotiated contracts. Civil Engineering Quantities. Standard method of measurements. Applications of the classification of coding. Applications of the classification of numbering of items. Bill of quantities.

UIL-CEE 434 Engineering Hydrology (2 unit, C: LH 30)

Learning Outcome

At the end of this course, the students should be able to:
1. Explain deeply the theories and concepts of different types of flows;
2. Discuss the principles of surface water hydrology for assessment and evaluation of floods;
3. Explicate the techniques for collection, processing and analysis of hydrological data and
the application of catchment hydrological modelling and aquifer modelling techniques; and
4. Demonstrate knowledge of the application of the principles of continuity and momentum
to pipe flow.

Course Contents

Laminar and Turbulent flows. Boundary layer separation lift and drag stream function, velocity
potential and application to flow nets. Steady and Unsteady flow in closed conduits. Principles
of surface water hydrology. Analysis of hydrological data. Land drainage and inland navigation
problems

UIL-CEE 412 Environmental Engineering (3 unit, C: LH 45)

Learning Outcome

At the end of the course, the students should be able to:
recognise the different types of environmental pollution, techniques for their monitoring and
control;
identify and value the effect of the pollutants on the environment: atmosphere, water and
soil;
analyse an industrial activity and identify the environmental problems;
explain the design of control systems for different types of pollution;
plan strategies to control, reduce and monitor pollution;
select the most appropriate technique to purify and/or control the emission of pollutants;
discuss the effects of solid waste on water sources; and
elucidate the laws and regulations governing environmental pollution.

Course Contents

Air pollution: monitoring and control, air pollutants, characteristics, sources, dispersion of
pollutants in air, dispersion models, equations, design of air pollution control systems.
Water pollution: types of water pollution, point sources and non-point sources, effects of
pollutants on water, control and management of water pollution. Solid waste management,
classification, quantification and composition of solid waste disposal methods; environmental
protection regulations.

500 Level

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.

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.

UIL-CEE 536 Water Resources Engineering (2 Unit; E; LH 30)

Senate-approved relevance

Training of high-quality graduates who are highly skilled and knowledgeable in water resources engineering in Nigeria are in agreement with University of Ilorin's mission to address African developmental challenges in producing civil engineering graduates. Relevance is seen in civil engineers from University of Ilorin being able to preserve, purify and distribute the Earth's most abundant resource. Water resource engineering help to determine how much water is needed, where water is available and how much

is available, and then determine the hydraulic controls necessary to convey water to where it is needed. This course will enable civil engineers to design works to control the flow of water in open channels, pipe networks, groundwater flow, and hydraulic structures. This is in view of sustainable development goal to provide clean water for all nations.

Overview

Access to clean water and water management is needed to crate progressive strategy for Nigeria's economy, and is an essential condition for enabling sustained economic growth. Water Resources Engineering is very vital approach used to increase and improve water in terms of quantity and quality available for sustainable development. Is the study and management of equipment, facilities and techniques that are used to manage and preserve lives. In addition to assessing how and the best ways in which to control water as it pertains to water-related activities. Water resources engineering will help to address community water needs.

This course focuses on population forecasting, projecting future water demand, data collection, data analyses, structural and non-structural water distribution system design, and cost-benefit analyses. Water resourcing engineering requires a comprehensive knowledge of water treatment so that the quality of water is improved upon for various end uses, whether that's recreationally, commercially or industrially.

Objectives

The objectives of the course are :

1 Identify source of water and its quality;
2 Compute water demand and forecasting consumption rate for future generation;
3 Describe three (3) methods of water supply for a city;
4 Identify the components of water supply network;
5 Identify effective methods of water treatment;
6 Conduct simple design of water supply network manually ;
7 Draw line diagram for water supply;
8 Forecast consumption rate for future generation;
9 Describe two (2) methods of distribution channels for a city; and
10 Conduct simple design of water supply network automatically by WaterCAD program.

Learning outcomes

On completion of the course, students should :

1. Determine five (5) sources of water and the minimum quality standard required;
2. Determine water demand for future generation;
3. Describe the branched and looped methods of water distribution system;
4. Design the intake structures (screen, pump, pipes, storage);
5. Describe two (2) processes of water treatment (screening, coagulation, flocculation, sedimentation);
6. Design water distribution channels using epanet and watercad programs;
7. Model water system using line diagram;
8. Forecast consumption rate for future generation;
9. Describe two (2) methods of distribution channels for a city;
10. Conduct simple design of water supply network automatically by WaterCAD program.

Course content

Raw water source. Water quality and pollution. Water demand forecasting. Water supply. Storage. Pumping. Water distribution systems. Pipe network analysis. Intake structure. Water treatment-flow diagrams. Surface treatment of water. Groundwater treatment. Preliminary treatment. Screening. Coagulation. Flocculation. Sedimentation. Slow sand, rapid sand and pressure filters disinfection. Water softening. Iron and manganese removal. Chemical water treatment. Computer application in the development of pipe network analysis. The use of Excel, Matlab and other commercial pipe network software like EPANET. Introduction to WaterCAD Program; drawing the elements of water supply system, insert data to the elements, design the network based on steady state case and extended period state, design the network with tank and pump operation conditions.

UIL-CEE 524 Geotechnical Engineering I [2 unit, C: LH 30]

Senate – approved relevance

The training of high-quality graduates who are highly skilled in the design and analysis of structures, evaluation, planning and creative design abilities in various ways that can contribute to the development of a more satisfying life and environment for the benefit of mankind, in Nigeria and the world at large is of great importance to University of Ilorin.

This is necessary to produce a vibrant civil engineers with adequate technical skills, fundamental concepts relevant to latest development, entrepreneurial competences, a sense of public responsibility, communication skills and management skills to handle national and international issues in civil engineering in relation to foundations of structures which will be of great assistance towards mitigating the incidences of building collapse in our country.

Overview

Foundation is the component of a structure which connects it to the ground, and helps to transfer loads from the structure to the ground. It is a general fact that all engineered infrastructures resting on the earth must be supported by foundation. Foundation is an important component of any civil engineering structure which must be safe, stable, and economically designed. This course "Foundation Engineering" is concerned with the application of soil mechanics(soil behavior), rock mechanics, structural analysis, and concrete, etc in the design of foundation components of structures.

The course on Foundation Engineering provides the students with the necessary geotechnical engineering skills to analyze soils and determine their suitability for construction purposes and design shallow and deep foundation systems under different loading and soil conditions. This will help to mitigate the incidences of building and other civil structures collapse in our country.

Objectives

The objectives of the course are:

1. Describe soil compaction, its importance, factors and demonstrate the laboratory test;
2. Describe soil concept and its formation;
3. outline seven (7) different soil minerals;
4. Describe soil stabilization, its importance and factors affecting it;
5. Describe sub - surface exploration, methods and its importance;
6. Identify in-situ .test (field test of soil) and laboratory testing;
7. Identify three (3) different properties of soils used for design purposes.;
8. Describe plastic equilibrium theory of soil;
9. Describe foundation types and demonstrate their designs;

10. Identify foundation settlement and relate the reason behind the failure of structures and foundations; and
11. Describe earth bracing and strutting techniques.

Learning outcomes

On completion of the course, students should:
1. Explain soil in relation to Civil Engineering and other fields of studies and how it is formed;
2. Explain seven (7) different soil minerals with respect to clay soils;
3. Identify soil compaction, its importance, factors, and demonstrate the laboratory test.;
4. Explain soil stabilization, its importance, factors, and demonstrate the laboratory test ;
5. Explain sub - surface exploration, methods and two (2) importance;
6. Explain four (4) differences in in–situ and laboratory testing;
7. Evaluate three (3) different properties of soils used for design purposes;
8. Explain plastic equilibrium theory of soil, and apply Rankine's theory;
9. List four (4) foundation types and demonstrate their designs;
8. Explain three (3) reasons for foundation failures;
9. Explain earth bracing and strutting techniques; and
10.explain four (4) different soil stabilization techniques.

Course content

Techniques of site investigation for geotechnical engineering. In-situ testing. Sub-surface stratigraphy. Stratigraphy interpretation for foundation of structures. Analysis of foundation. Design of foundations. Design of dewatering system. Settlement. Rankine's theory. Soil stabilization. Importance of soil stabilization. Factors affecting stabilization. Different soil stabilization techniques. Soil minerals. Foundation failures. Sub - surface exploration. Methods of sub-soil exploration.

UIL-CEE 562 Design of Structures I [2 unit, C: LH 30]

Senate-approved relevance

Providing a world-class civil engineering graduates, who are highly skilled and knowledgeable in the design and analysis of structures, evaluation, planning and creative design abilities in various ways that can contribute to the development of a more satisfying life and environment for the benefit of mankind. This is in line with the mission of University of Ilorin. This is necessary to produce a role model, self-reliant and excellence civil engineers with adequate technical skills, fundamental concepts relevant to latest development, a sense of public responsibility and communication skills to handle national and international issues in civil engineering. This course will help to mitigate the incidences of incessant building collapse in our country.

Overview

Creativity and innovation is a core in solving engineering problem. A problem unique to the design of reinforced concrete structures is the need to detail each member throughout. For concrete structures, we must determine not only the area of longitudinal and lateral reinforcement required in each member, but also the best way to arrange and connect the reinforcement to insure acceptable structural performance. This procedure can be made reasonably simple, if not easy. Purpose of this course is to establish a firm understanding of behavior of reinforced concrete structures, then to develop method used in current practice and to achieve familiarity with codes and specifications governing practical design.

In this course, the students will learn the basic performance of concrete and the behavior of reinforced concrete structures. It is also designed to provide knowledge and skills in architectural drawing, health and safety, building technology and computer aided design.
This course deals generally with the analysis and design of reinforced concrete elements such as foundation, column, beam, slab and roof design.

Objectives
The specific objectives of this course are:
1. Explain design philosophy as it relates to reinforced concrete structures;
2. Explain the limit state function in reinforced concrete;
3. Recall the limit state function in the design of concrete elements;
4. Identification and careful selection of foundation type;
5. Execute the design of a reinforced concrete model using the rc codes of practice;
6. Sketch all reinforced concrete elements after design;
7. Analyze, design and detail of reinforce concrete structures;
8. Prepare design for submission at the urban and regional planning(urp) unit;
9. Illustrate production of general arrangement from architectural drawing; and
10. Outline and produce detailed sections of plans with ease.

Learning outcomes
At the end of this course, the students should :
1. Explain the purpose, methods of design and the aim of structural design;
2. Describe the two types of limit state function;

3. Apply the limit state function in structural design;
4. Determine dimensions of base and carefully select the appropriate foundation type for structure;
5. Explain the importance, application of building regulations and codes of practice;
6. Evaluate structural design results and detailing of such design;
7. Implement design and detailing of basic reinforced concrete (rc) structures e.g bungalow rc, high rise, box culvert;
8. Arrange the documentation/report on designs of typical rc structure;
9. Generate general arrangement from an architectural plan; and
10. Explain detailed sections from plan with ease.

Course content
Analysis and design of multi–storey building. Prestressed concrete. Hydraulic structures. Culverts. Water retaining structures. Composite construction. General arrangement generation. Design considerations for bridges. Standards and codes of practice. Methods of construction. Earth-retaining Structure. Foundation type for structure. Limit state design. Serviceability state design.

UIL-CEE 565: **Structural Analysis IV (2 Units: C; LH 30)**
Senate-approved relevance
To respond to worldwide demand for engineers that have a sound knowledge of engineering and analysis principles with the ability to apply this knowledge to complex situations prevailing within construction and manufacturing industries. This is in line with University of Ilorin mission.

Our graduates will be a role model, self-reliant and excellence civil engineers with adequate technical skills and fundamental concepts relevant to sustainable development.

Overview

This course is focused on the advance methods (theorems) for the analysis of indeterminate structures. Clearly it is important to avoid deformations so large that they may prevent the structure from fulfilling the purpose for which it is intended. But the analysis of deformations may also help us in the determination of stresses. It is not always possible to determine the forces in the members of a structure by applying only the principle of statics. This is because statics is based on the assumption of undeformable, rigid structures.

Objectives

The objectives of the course are:

1. Perform analysis of indeterminate structures using approximate methods;
2. Explain some structure support such as fixed end moment (fem) and bending moment analysis for a statically indeterminate structures using moment distribution methods;
3. Apply plastic analysis of multi-bay;
4. Understand the influence line coefficients and other structural parameters in beams using influence line theorems;
5. Explain yield line analysis of slab;
6. Introduce the elastic structural instability and simple plastic theory of bending collapse loads;
7. Explain the influence line diagrams for the reactions at the supports of a beam;
8. Differentiate the influence lines for shear, bending moment, deflection and slope at any point on the beam;
9. Illustrate the proof of the Castiglianos; and
10. Identify two (2) classical methods of analysis.

Learning outcomes

At the end of the course, students should :

1. Outline procedure and identify the formulation technique of beam to achieve structural response using approximate method;
2. Derive the slope deflection method equations using mechanics and mathematics;
3. Describe the concept of fixed-end moments;
4. Compute stiffness factors, distribution factors, balance moment and carry-over moment for various members in a continuous beam using the moment distribution method;
5. Perform plastic analysis of multi-bay;
6. Derive the influence lines for moving loads on trusses and beams;
7. Draw the influence line diagrams for the reactions at the supports of a beam;
8. Construct influence lines for shear, bending moment, deflection and slope at any point on the beam;
9. Solve problems associated with yield line analysis of slab;
10. Determine the reactions and drawing the bending moment diagram for a simply supported beam, propped cantilever and fixed supported beam using the least work theorem; and

11. Solve simple elastic structural instability and simple plastic theory of bending collapse loads.

Course content

Approximate method of analysis for frame structures. Yield line analysis of slabs. Structural forms. Plastic analysis of multi-bay. Multi-storey frame buildings. Slope Deflection Method. Stiffness factors method. Distribution factors method. Balance moment method. Carry-over moment method. Propped cantilever beam using the least work theorem. Fixed supported beam using the least work theorem. Simple elastic structural instability. Theory of bending collapse loads.

UIL-CEE 567 Advance Structural Analysis and Design I [2 unit; E: LH 30]

Senate-approved relevance

Through its teaching, research, and innovation activities, University of Ilorin is poised to be a major contributor in the advancement of knowledge, wisdom and understanding for the benefit of our country and the world in general. Our graduates will be a role model, self-reliant and excellence civil engineers with adequate technical skills, fundamental concepts relevant to sustainable development, entrepreneurial competences, a sense of public responsibility, communication skills and management skills to handle national and international issues in civil engineering.

Overview

It is not always possible to determine the forces in the members of a structure by applying only the principle of statics. This is because statics is based on the assumption of undeformable, rigid structures. By considering engineering structures as deformable and analyzing the deformations in their various members, it will be possible to compute forces which are statically determinate.

This course focused on the advance methods (theorems) for the analysis of indeterminate structures. The goal of this course is to provide students with advanced knowledge of Civil Engineering mechanics and show its applications especially how it can be applied to solve Structural Engineering problems.

Objectives

The objectives of the course are :

1. Identify energy and virtual work principles of structural Analysis for beams and frames based on the displacement and force approaches;
2. Describe dynamic analysis of frames using any of the displacement and force method,Analysis of indeterminate structures using Energy principles;
3. Describe analysis of thin plate and shells using classical plate theorems;
4. Explain introduction to Soil structure interaction;
5. Evaluate the effect of resonance on a structure and Drawing the bending moment diagrams and shear force diagrams for different types of beams and frames under static and dynamic condition;

6. Illustrate a statically analysis of plates and shells in Cartesian co-ordinate;
7. Explain the geometrical load carrying characteristics of plate and shell structures;
8. Illustrate comparative analysis in solution of problems of plate and shells using various methods such as: Navier, Levy and Energy approach;
9. Analyse the effect of resonance on a structure; and
10. Sketch the bending moment diagrams and shear force diagrams for different types of beams and frames under static and dynamic condition.

Learning outcomes

At the end of the course, students should :

1. Explain advanced energy and works principles and its application in the beam and frame structures;
2. Perform a comparative analysis of beams and frames using the classical displacement methods, stiffness and flexibility method;
3. Explain force and displacement analysis of beams and frames are performed by generating matrices in a statically indeterminate structures;
4. Determine the natural and forcing frequency in the solution of dynamic problems;
5. Compute three (3) equations of motion for the free and force vibration analysis of frame structures;
6. Describe the stiffness or flexibility analysis of frames under motion are performed by generating matrices in an indeterminate frame structures;
7. Explain the effect of resonance on a structure and drawing the bending moment diagrams and shear force diagrams for different types of beams and frames under static and dynamic condition;
8. Describe statically analysis of plates and shells in cartesian co-ordinate using any of the classical plate theories;
9. Explain the geometrical load carrying characteristics of plate and shell structures and its numerical solutions interpretation;
10. Illustrate comparative analysis in solution of problems of plate and shells using various methods such as: navier, levy and energy approach; and
11. Describe six (6) effects of resonance on a structure and drawing the bending moment diagrams and shear force diagrams for different types of beams and frames under static and dynamic condition.

Course content:

Advanced topic of matrix methods of structural analysis. Finite difference and finite element methods. Structural vibrations, model analysis. Introduction to the theory of plated and sheets. Levy and Energy approach. Classical plate theories. Characteristics of plate and shell structures. Resonance on a structure. Dynamic loading on structure. Energy work principle. Virtual work principles of structural Analysis. Navier approach. Flexibility analysis of frames under motion.

UIL-CEE 568 Advanced Structural Analysis and Design II (2 Units E: LH 30)

Senate-approved relevance

Develop technical knowledge, training high quality graduates who are highly skilled and knowledgeable in the design and analysis of structures, evaluation, planning and

creative design abilities in various ways that can contribute to the development of a more satisfying life and environment for the benefit of mankind. This is in accordance with the vision and mission of University of Ilorin.
This is necessary to produce a role model, self-reliant and excellence civil engineers with adequate technical skills, fundamental concepts relevant to latest development, entrepreneurial competences, a sense of public responsibility, communication skills and management skills to handle national and international issues in civil engineering. This will help to mitigate the incidences of building collapse in our country.

Overview

An important aspect of the analysis and design of structures relates to the deformations caused by the loads applied to a structure. Clearly it is important to avoid deformations so large that they may prevent the structure from fulfilling the purpose for which it is intended. The structural design is based on the result of the analysis which helps to obtain the maximum bending moment.

Objectives

The objectives of the course are:

1. Explain two (2) modern structural forms and model of structural drawing;
2. Identify building system and multi-storey building project design;
3. Illustrate composite design and construction in steel and reinforced concrete;
4. Evaluate design of structural foundation and pre-stressed concrete design;
5. Describe tall buildings lift, shaft, plate girders, stanchions and shear walls using corrosion protection devices;
6. Explain the geometrical load carrying characteristics of plate and shell structures and its numerical solutions interpretation;
7. Describe a comparative analysis in solution of problems of plate and shells using various methods such as: navier, levy and energy approach;
8. Analyse the effect of resonance on a structure; and
9. Sketch the bending moment diagrams and shear force diagrams for different types of beams and frames under static and dynamic condition.

Learning outcomes

At the end of the course, the students should :

1. Explain two (2) structural modeling from architectural drawing for both residential (duplex and blocks of flat) considering all the dimensions and specification;
2. Describe composite design and construction of steel and reinforce concrete long columns, short columns, one-two ways spanning slabs, beams, water retaining structures and retaining walls;
3. Explain column load transfer and analysis of building system and multi-storey building project design;
4. Interpret soil test result and design structural strip and pad foundation based on the result of the soil analysis;
5. Explain the theory of pre-stressing and losses of pre-stressing in the steel and reinforced concrete and calculate stresses and pre-stress force required;
6. Perform a complete design and detailing of steel, reinforced and pre-stressed concrete structures;

7. Explain the geometrical load carrying characteristics of plate and shell structures and its numerical solutions interpretation;
8. Illustrate comparative analysis in solution of problems of plate and shells using various methods such as: navier, levy and energy approach;
9. Analyse the effect of resonance on a structure; and
10. Sketch the bending moment diagrams and shear force diagrams for different types of beams and frames under static and dynamic condition.

Course content:

Planning and design of structures. Analysis of prestressed concrete. Design of prestressed concrete. Composite steel-concrete structures. Modern structural forms. Methods of construction. Design projects for complete structure. Tall buildings lift. Shaft. Plate girders. Stanchions. Shear walls. Column load transfer. Column analysis of building system. Geometrical load carrying characteristics of plate.

UIL-CEE 575 Transportation Engineering II (2 unit; C; LH 30)

Senate-approved relevance

Training of high-quality graduates who are highly skilled and knowledgeable in transportation engineering in Nigeria. Relevance is seen in civil engineers being able to design, construct and maintain highway to address the potholes and road failure issues, which result from inadequate and improper design and construction of highway. This will help to develop the community and the country at large.

Overview

Transportation is a field of a number of national and international activities starting from village to districts towns to state and provincial towns, from state towns to national towns and from national towns to international towns. The means of transportation in the above exercise vary from pedestrian traffic to animal-drawn transport and finally to Jambo jet aircraft.

Transportation engineering is a vital approach used to improve the road infrastructures in terms of quality of road construction for sustainable development in the country. Transportation engineering courses will help in mitigating the rate of traffic congestion and accident experiences in the country recently.

Objectives

The objectives of the course are :

1. Identify Nigeria road network system;
2. Design for individual elements of highway geometry;
3. Identify and analyse the components of traffic management ;
4. Conduct experiments for ascertaining the quality of highway materials;
5. Identify various stages in construction of pavements;
6. Explain horizontal alignment; simple circular and transition curves, super elevation and pavement widening in horizontal curves;
7. Explain vertical alignment; gradient limits, curves types, summit curves and valley curves;
8. Design the co-ordination of vertical and horizontal alignment, highway cross-section elements;
9. State different pavement types; (Flexible, rigid and composite), pavement layers and their functions; and
10. Explain differences and similarities between flexible and rigid highway pavements;

Learning outcomes:
At the end of the course, the students :

1. Explain the road network development and Highway planning in Nigeria ;
2. Design four (4) road geometric elements based on the geographic conditions;
3. Identify the traffic characteristics and application of traffic management techniques;
4. Implement analysis of two (2)various highway materials and their suitability for construction;
5. Apply two (2) different design methods for road construction;
6. Explain vertical alignment; gradient limits, curves types, summit curves and valley curves;
7. Design the co-ordination of vertical and horizontal alignment, highway cross-section elements;
8. State three (3) different pavement types; (Flexible, rigid and composite), pavement layers and their functions;
9. Explain four (4) differences and similarities between flexible and rigid highway pavements; and
10. Analyse the components of traffic management.

Course content:
Road pavement characteristics. Simple design method. Construction and maintenance of roads including labour-based methods. Study of Nigerian highways design policies standards and specifications. Comparisons with international standards. Rail transport. Railway gauges. Track design. Plate Laying. Interlocking. Signaling. Stabilised road. Geometric design of highways. Low cost road.Cargo handling. Road and road transport. Types of pavement. Improving road system. Planning of highways.

UIL-CEE 582 Civil Engineering Service [2 unit, C: LH 30]

Senate-approved relevance
This course will help to develop knowledge, skills including transferable skills, such as leadership, motivation, time management, prioritization, delegation, listening, communication, analytics and understanding, as well as awareness and "know how", in the fields of civil engineering and its related disciplines so that our graduates will be equipped to enter into self-employment and employment as professional engineers progressing on to Registered Engineer or (equivalent status) or a wide range of other professional careers. Our graduates will be professional engineers trained on leadership track and contract administration. This course will also provide the engineering industry and profession, in Nigeria and elsewhere, with ready employable and enterprising graduates prepared for the assumption of technical, managerial and financial responsibilities. This is in line with the mission and vision of University of Ilorin.

Overview
The practice of civil engineering is a profession which involves the designing and executing structural works that serve the general public, such as dams, bridges, aqueducts, canals, highways, power plants, sewerage systems, and other infrastructure.

In this course, the diverse aspects of civil engineering services are examined and described, with relevant supporting examples. It starts by considering the general backcloth to civil engineering works including water supply installation, fire extinguisher installation etc.

Objectives
The specific objectives of this course are:

1. Describe civil engineering services and outline its applications;
2. Describe the principle of civil engineering;
3. Outline the factors of water installation;
4. Outline the influence of hot water system;
5. Describe sanitary appliances;
6. Describe methods of refuse disposal;
7. Describe equipment for air conditioning;
8. Identify fire fighting system;
9. Outline the importance of ventilation; and
10. Identify standby power source.

Learning outcomes
On completion of the course, students should :
1. Explain civil engineering services and outline six (6) of its applications;
2. Explain the principle of civil engineering;
3. List three (3) factors to be considered in water installation;
4. Explain the influence of hot water system;
5. Explain four (4) sanitary appliances ;
6. Explain two (2) methods of refuse disposal;
7. Describe five (5) equipments for air conditioning;
8. Explain fire fighting system;
9. Outline four (4) importance of ventilation; and
10. Explain standby power source.

Course content
Water supply and installation. Hot water systems. Sanitary appliances. Methods of refuse disposal. Equipment for air conditioning. Equipment for ventilation. Installations for industrial buildings. Gases. Liquids. Refrigeration. Vacuum cleaning. Firefighting systems. Electrical and high circuits. Standby power sources. Voltage Determination. Factors affecting water installation. Hot water system mechanism.

UIL-CEE 584 Computer Application in Civil Engineering [2 units, C: LH 30]
Senate-approved relevance
This course will help to develop knowledge, skills and provide practical solutions to problems by applying their knowledge of modeling and their ability to design, develop and implement in at least one of the key areas in civil engineering: construction, construction materials, geotechnical engineering, transportation engineering and hydraulic engineering. This is in line with University of Ilorin vision and mission. It will adopt lifelong learning as a core principle in their working life, keep up-to-date with the latest developments in the field of Civil Engineering and maintain a demonstrable commitment to continued professional development.

Overview
This course is hands-on. It teaches the students the use of some Civil Engineering Design software for the design of reinforced concrete and steel structures. This course will help the students to apply modern technology for easy design of reinforced concrete and steel structures. Computer aided design tool will increase speed, reduce error and manage space in the design of steel or concrete structures.
This course will provide our graduates with the ability to apply modern methods, for the purpose of designing to meet specific needs of a complex system, process, device or product, under realistic constraints and conditions

Objectives

The specific objectives of this course are:

1. Explain the various softwares used in civil engineering profession;
2. Explain its application to civil engineering works;
3. Evaluate the use of autocad for drafting;
4. Explain the process of modelling using orion 18, prota steel and civil 3d,
5. Examine the use of matlab, fortran for solution to boundary problems, graphs, matrix solution;
6. Examine the use of archicad home deluxe;
7. Implement a design project in rc or steel structures;
8. Explain inbuilt codes in program writing;
9. Describe engineering codes to design; and
10. Describe software results.

Learning outcomes

At the end of this course, the students should :

1. Have good grasp of use of orion, prota-steel, civil 3d and other software related to civil engineering designs;
2. Apply the use of five (5) software to civil engineering designs;
3. Compare and contrast the drafting of rc using autocad, orion and prota-steel;
4. Produce model of structures using autocad, orion and prota-steel;
5. Solve linear equations, plot graphs using matlab gui;fortran, qbasic;
6. Implement full design of rc or steel structures using autocad, orion and prota-steel;
7. Write program to solve at least three (3) problems on structural elements;
8. Translate engineering codes to design;
9. Interpret software results; and
10. explain inbuilt codes in program writing.

Course content

Computer aided design using ARCHICAD. Computer aided design using Home deluxe. Design using ORION 18. Design using CIVILStruct. Review of computer programming and programming languages (FORTRAN, BASIC, etc). Computer applications in structural engineering, highway engineering, individual or group projects on computer solutions of specific problems. Design Report. Drafting using AutoCad. Drafting using Prota. Detailing using Prota. Drafting using FASTRACK. Drafting using STAADPro. Modelling using SAP. Modelling using ABACUS.

UIL – CEE 585 Advanced Geotechnical Engineering I [2 unit, C: LH 30]

Senate –approved relevance

The training of high-quality graduates who are highly skilled in the design and analysis of structures, evaluation, planning and creative design abilities in various ways that can contribute to the development of a more satisfying life and environment for the benefit of mankind, in Nigeria and the world at large is of great importance to University of Ilorin.

This is necessary to produce a role model, self – reliant and excellent civil engineers with adequate technical skills, fundamental concepts relevant to latest development, entrepreneurial competences, a sense of public responsibility, communication skills and management skills.

Overview

Foundation is the component of a structure which connects it to the ground, and helps to transfer loads from the structure to the ground. It is a general fact that all

engineered infrastructures resting on the earth must be supported by foundation. Foundation is an important component of any civil engineering structure which must be safe, stable, and economically designed. This course "Foundation Engineering" is concerned with the application of soil mechanics (soil behavior), rock mechanics, structural analysis, and concrete, etc in the design of foundation components of structures.

The course on Foundation Engineering provides the students with the necessary geotechnical engineering skills to analyze soils and determine their suitability for construction purposes and design shallow and deep foundation systems under different loading and soil conditions. This will help to mitigate the incidences of building and other civil structures collapse in our country.

Objectives

The objectives of the course are:

1. Describe the concept of soil in relation to Civil Engineering and other fields of studies and also its formation;
2. Outline the different soil minerals with respect to clay soils;
3. Describe soil compaction, its importance, factors and demonstrate the laboratory test;
4. Describe soil stabilization, its importance, factors, and the different soil stabilization techniques;
5. Describe sub - surface exploration, methods and its importance;
6. Identify in-Situ .test (field test of soil) and Laboratory testing of soils and demonstrate some in the laboratory;
7. Identify the different properties of soils used for design purposes;
8. Describe plastic equilibrium theory of soil, and carry out the computation of active and passive earth pressure using Rankine's theory;
9. Describe foundation in relation to structures and building, its types and demonstrate their designs; and
10. Identify foundation settlement and relate the reason behind the failure of structures and foundations.

Learning Outcomes

At the end of the course, students should:

1. Explain soil in relation to Civil Engineering and other fields of studies and how it is formed;
2. Explain three (3) different soil minerals with respect to clay soils;
3. Describe soil compaction, its importance, two (2) factors and demonstrate the laboratory test;
4. Describe soil stabilization, its importance, factors, and the different soil stabilization techniques;
5. Explain sub - surface exploration, methods and its importance;
6. Explain the different in–situ and laboratory testing that can be carried out on soil and demonstrate some in the laboratory;
7. Differentiate the properties of soils used for design purposes;
8. Explain plastic equilibrium theory of soil, and apply Rankine's theory in the computation of earth pressures;
9. Explain foundation with respect to structures and building, its types and demonstrate their designs; and
10. Compute foundation settlement and explain the reasons for foundation failures.

Course content

Origin of soils–rocks and minerals. Soil structure. Review of structural foundations. Types. Choice and design. Slope stability analysis. Total stress. Parallel slope. Tension crack. Swedish circle. Taylor's technique. Bishop conventional and resource

methods. Factor of safety. Bearing capacity. Ultimate stress. Safe and allowable stress. Lower and upper bound theorems. Applications.

UIL-CEE 586 Geotechnical Engineering II [2 unit, C: LH 30]

Senate – approved relevance

To respond to worldwide demand for engineers that have a sound knowledge of engineering and principles with the ability to apply this knowledge to complex situations prevailing within construction and manufacturing industries to the development of a more satisfying life and environment for the benefit of mankind, in Nigeria and the world at large is of great importance to University of Ilorin. This is necessary to produce a role model, self – reliant and excellent civil engineers with adequate technical skills, fundamental concepts relevant to latest development, entrepreneurial competences, a sense of public responsibility, communication skills and management skills to handle national and international issues in civil engineering in relation to foundations of structures which will be of great assistance towards mitigating the incidences of building collapse in our country.

Overview

Soils are the bed on which foundations rest on, and the material on the ground which loads are finally are transmitted to, as such this make soil very important in this regard in addition to other of its applications. Stresses are developed on the soil as results of loads and the ability for the soils to be able to resist these stresses is also of great importance in order for it to be able to carry the intended constructions.

The course will equip the students with the adequate knowledge on the analysis of stresses in soils, computation of earth pressures, soil bearing capabilities, slope stability, which are vital in the safe and economic design and analysis of elements in civil structures like retaining walls, pile foundations, etc, in Nigeria.

Objectives

The objectives of the course are:

1. describe the stresses in soils;
2. Relate Boussinesq's and Westergaard's theories to soil stress distribution;
3. Describe retaining walls, types, and their applications;
4. Relate the earth pressures using already established theories;
5. Describe and determine soil bearing capacities;
6. Describe pile foundation and outline its applications;
7. Describe slope stability and design;
8. Describe techniques involved in ground improvement;
9. List parts of counterfort wall; and
10. Write out equations for determining pressure.

Learning outcomes

On completion of the course, students should:

1. Explain three (3) stresses in soils;
2. Apply the Boussinesq's and Westergaard's theories in relation to soil stress distribution;
3. Sketch and explain retaining walls, types, and their applications;
4. Compute the earth pressures using already established theories;
5. Compute soil bearing capacities;
6. Explain pile foundation and four (4) applications of it;
7. Analyze slope stability and design;
8. Explain ground improvement techniques;
9. Sketch counterfort wall with well labeled parts; and
10. Apply equations of pressure to solve problems;

Course content
Earth pressure design. Types of walls. Limiting equilibrium equations. Earth pressure at rest candling. Active and passive pressure equations to gravity. Applications of pressure equations to gravity. Counterforts walls. Coulomb methods and applications. Sheet pile walls. Cantilever and propped/anchored. Revised safety factor. Examples of design. Reinforced earth theory and application to walls. Pile foundations. Types of Pile foundation. Pile design approaches. Empirical and analytical design. Skin frictions. Piles in clay and granular soils. Buried structures and tunnels. Ground improvement techniques.

UIL-CEE 531 Hydraulic Engineering II (2 units, C: LH 30)

Learning Outcome
At the end of this course, the students should be able to:
1. Explain the fundamentals of reinforced concrete design;
2. Select materials for different structural problems;
3. Design structural elements in reinforced concrete;
4. Discuss the principles of the design of hydraulic structures to address water resources
problems; and
5. Design structures such as dams, spillways and gates.

Course Contents
Fundamentals of design process, material selection, building regulations and codes of practice.
Design philosophy. Elastic design: limit state design. Design of structural elements in reinforced concrete. Hydraulic models: hydraulic design criteria, problems of reservoirs, river training and regulations, transition structures. Dams; weirs, spillways, gates and outlet work, stilling basins. Cofferdams, breakwaters, moldes, surge tanks. Design of open channels, conduit systems and hydraulic machinery. Design of municipal storm drains, land drainage systems and culverts and bridges. Design of (i) drainage inlets, (ii) manholes, and (iii) catch basins. Introduction to multiple purpose designs involving flood control, water supply, irrigation, recreation, drainage navigation and erosion control. Computer-aided design of structures.

UIL-CEE 577 Transportation Systems Analysis and Design I (3 units, C: LH 45)

Course contents

Roads and Railways traffic analysis and design, including definition and determination of the level of service and capacity for different types of roads and railways. Design of traffic control schemes.

UIL-CEE 578 Transportation Systems Analysis and Design II (3 units, C: LH 45)

Course contents

Planning and management methods for roadways, waterways, runways, and railways. Pavement analysis and design methods.

Minimum Academic Standards

Equipment
List of Laboratories/Workshop and Equipment

Structural Engineering
1. Civil Engineering Materials Laboratory
2. Structures
   Laboratory:
   Routine
   testing
   Models and prototype testing
   Studio/design
   officeGeotechnical Engineering

Field soil survey and testing (including sub-soil investigation and drilling) Laboratory soil/rock testing

Geodetic Engineering and Photogrammetry
1. Laboratory equipment stores
2. Photogrammetry and Remote sensing Laboratory

Water Resources and Environmental Engineering
1. Hydraulics Laboratory
2. Hydrology Laboratory
3. (iii)Environmental Health Laboratory

Highway and Transportation Engineering
1. Highway Materials Testing Laboratory
2. Pavement Laboratory.

Major Equipment

Structural Engineering Laboratory
1. Universal Testing Machine with accessories for tension, compression,
2. transverse 180^{o} cold bend, double shear, punching and brunel hardness tests. Capacity – 10000KN; Transverse beam – 500KN.
3. Proto-type tests facilities for testing of proto-type in structural elements, i.e. beams, frames, trusses, etc. Accessories for the purpose include 1000KN, 250KN load rings, electronic load cells, faculty workshop facilities, DEMEC High accuracy gauges, hydraulic jacks, etc.
4. Compression testing machine and transverse flexural testing frame: suitable for standard compression, flexural tensile tests and split cylinder tests on standard concrete and wood specimens to BS 1881 and CP 112 respectively. Shear rig can be manufactured and attached to this machine for testing shear strength of wood and glued wood joints. Capacity of the machine is 2500KN.
5. Routine testing and demonstration equipment: This includes armfield extensometres, arch frames, suspension bridge frame and pin-jointed frame work.
6. Concrete batching and making equipment:
   Multi-flow mixers, 112 Dm^3 ($4ft^3$) and 56 Dm^3($2ft^3$) capacities
   200-240V. Test BS sieves of various sizes
   Semi-automatic scale 25kg

capacity Automatic scale 500kg
capacity
Standard moulds of various sizes and tamping
rods Vibrating table

7. Concrete quality and workability
equipment: Slump cone apparatus to
BS 1881 ASTM CI43 Compacting factor
apparatus to BS 1881 (2 sizes) Vibro
Consistometre to BS 1881
Vicat apparatus
Air entrainment metre

Water Resources and Environmental Engineering Laboratory

1. Laminar/turbulent pipe flow apparatus
2. Radial flow pump
3. Radial flow turbine
4. Surges in pipes apparatus
5. Surge tower
6. Water hammer apparatus
    a. Evaporating dish
7. Steam bath or infrared lamp
8. Drying oven
9. Desiccator
10. Analytical balance
11. Reagents – Sodium hydroxide, in distilled
12. Water, phosphate buffer solution, magnesium
13. Sulphate solution, calcium chloride solution, ferric chloride solution, acid and alkali solution, etc
14. Laboratory flow channel
15. Fibre glass
16. Thermometres
17. Funnels
18. Test Tubes

Geotechnical Engineering/Highway and Transportation Engineering Laboratory:

1. Tri-axial testing machine complete with transducers cells and accessories
2. Motorized direct/residual shear box machine complete with load rings, set of weights and accessories
3. CBR Testing machine complete with moulds, load ring gauges and accessories
4. Consolidation apparatus complete with cells, gauges and set of weights
5. Laboratory vane test apparatus complete with set of springs and motorizing attachment
6. Large capacity floor-mounting electric ovens 40^{o}C to 16^{o}C
7. Hotplates with Simmersat heat control unit 220–240V, 2000 W
8. Mettler top-loading balance with optical scale 100 g, Readability 0.01 g, capacity1.3 kg
9. Graduated twine beam scale complete with two stainless steel pans 0 to 200 g x10g
10. Semi-automatic balances, 25kg capacity complete with scoope and set of counter weights
11. Autographic unconfined compression apparatus complete with platens springs
12. Unconfined compression apparatus complete with platens and strain gauge mounting assembly and dial gauge

13. Automatic sieve shaker for up to 200 mm diametre sieve
14. BS sieves 212 mm to 8 mm and 200mm diametres
15. Simple hand boring sampling augers complete with accessories
16. Portable drilling unit with two-stroke petrol engine and two pairs of handles complete with extension rods
17. Atterberg limits determination apparatus complete with liquid limit device and accessories
18. High-speed stirrer complete with cup and baffler
19. Constant temperature bath complete with hydrometre jars, watt heater, thermostat, etc
20. CBR Marshall tester complete with breaking head stability mould and flow metre dial gauge
21. Compaction pedestal complete with hammer and mould body
22. Constant head permeability apparatus complete with cells and accessories
23. Standard proctor compaction mould, 1000 cm^3 capacity complete with rammers and accessories
24. GEONOR swelling test apparatus complete with cells and accessories
25. Riffle boxes complete with three rigid metal containers
26. Wax melting pot with thermostatic control up to 150^oC range
27. Hand-operated extruder – screw type sample extruder for 38mm dia. Complete with built- in sample tube supports
28. Proctor/core cutter extruder comprising a frame and a 15-KN hydraulic jack
29. Universal extruder comprising a frame and a 15-KN hydraulic jack
30. Bench-moulding mixer with three-speed gear box complete with stainless steel bowl 7.5 dm^3 capacity
31. Long stem soil hydrometre graduated 0.995 to 1.030 g/ml
32. Sieving extractor complete with clamps and clamming ring for use with sieves of 200mm dia
33. Minor centrifuge complete with 8-place angle head, 8 x 50 ml metal buckets and caps
34. Ductilometre for testing 4 specimens complete with briquette moulds and base plate
35. Flash and fire-points apparatus gas heated.

Geodetic Engineering and Photogrammetry Laboratory:

1. Theodolites
2. Levels
3. Compasses
4. Umbrellas
5. Protractors
6. Steel tapes
7. Engineer's chains
8. Ranging rods
9. Surveyor's scales
10. Theodolites
11. Levels
12. Compasses
13. Umbrellas
14. Protractors
15. Steel tapes
16. Engineer's chains
17. Ranging rods
18. Surveyor's scales
    a. Various graph paper

b. French curves
c. Log tables

19. Planimetres
20. Plumbulbs
21. Arrows
22. Field books
23. Modern survey equipment as affordable e.g. Total Station, Global Positioning System (GPS), Terrestrial Laser Scanner (TLS).

Staffing Academic Staff

The NUC guidelines on staff/student ratio of 1:15 for Engineering and Technology
departments shall apply. However, there should be a minimum of six full-time equivalents of Staff in the department. There is need to have a reasonable number of Staff with doctoral degrees as well as sufficient industrial experience. With a minimum load of 15 Units per semester for students and a minimum of six full-time equivalent of staff in each programme, staff should have a maximum of 15 contact hours per week for lectures, tutorials, practical's and supervision of projects.

NUC requirement encourages all academic staff to have PhD degrees; hence appointment of academic staff is preferably to the Lecturer cadre. Only in exceptional cases are

candidates with great promise appointed to Graduate Assistant and Assistant Lecturer positions for the purpose of being developed to the Lecturer cadre as registered PhD candidates.

Academic Support Personnel

Teaching Assistant/Demonstrators to help lecturers in the conduct of tutorials, practical's and field work. This category of personnel is not expected to be regular staff as they are to be paid on the basis of approved hourly rate.

Administrative Support Staff

The services of the administrative support staff are indispensable in the proper administration of the departments and faculty offices. It is important to recruit very competent senior staff that are computer literate.

Technical Support Personnel

The services of technical support staff, which are indispensable in the proper running of laboratories and workshop/studios are required. It is important to recruit very competent senior technical staff to maintain teaching and research equipment. They are also to undergo regular training to keep them abreast of developments in equipment operation and maintenance. The minimum of academic staff to technical staff ratio of 5:1 should be maintained.

Student/Staff Ratio

The minimum staff-to-student ratio should be 1:15 from 200 level to 500 level.

Library

There must be adequate library facilities to cater for the interest of all the programmes in the faculty. These include current journals, handbooks, textbooks, manuals, codes of practice, standards and specifications etc. in sufficient numbers**.**

Library Facilities
The following facilities should be provided to enable users make maximum use of library services:

1. Reading Rooms
2. Visually Impaired Resource Centre
3. Radio Frequency Identification (RFID) Security gate for theft detection
4. RFID tags for book tagging
5. Notebook computers for loan service
6. Over two hundred computers distributed at the various service points for Database search at the University library and Faculty Libraries
7. Workstations at the Faculty Libraries for Database search
8. Projectors and Screens for presentations
9. Photocopying machines
10. Scanners
11. Visually Impaired Resource Centre
12. Information display screen
13. E-Library (postgraduate and undergraduate sections)
14. Discussion Rooms

Types of Laboratories
Chemistry and Reaction laboratory
Unit Operations laboratories – at least
3 Instrumentation laboratory
Thermodynamics and Heat transfer laboratory

Physical space requirement:

Academic	**m^2**
Professor's Office	18.50
Head of Department's Office	18.50
Tutorial Teaching Staff Space	13.50
Other Teaching Staff Space	7.00
Technical Staff Space	7.00
Science Staff Research Laboratory	16.50
Engineering Staff Research Laboratory	14.50
Seminar Space per student	1.85
Drawing Office Space (A.O. Board) (Per Student)	4.60
Drawing Office Space (A.I. Board) (Per Student)	3.70
Laboratory Space	7.50
Non-Academic	
Secretarial Space	7.00

Office Accommodation

S/No	**Office**	**No in Room**	**Facilities**
1.	HOD	1	Table, chairs, A/C, filing cabinet, bookshelves, computer unit, Secretary and facilities.
2.	Professor	1	Table, chairs, A/C, filing cabinet, bookshelves, computer unit, Secretary and facilities.
3.	Reader	1	Table, chairs, A/C, filing cabinet, bookshelves, computer unit.

4.	Senior Lecturer	1	Table, chairs, A/C, filing cabinet, bookshelves, computer unit.
5.	Lecturer I	2	Table, chairs, fan, filing cabinet, bookshelves.
6.	Lecturer II	3	Table, chairs, fan, filing cabinet, bookshelves.

REGULATIONS

EXAMINATION CODE OF CONDUCT, OFFENCES AND PENALTY

Candidates shall:

a. Not use or consult books, papers, instruments or other materials or aids during the examination except permitted or provided by the University;
b. Not introduce or attempt to introduce into the examination venue, hand bags, books, notes, mobile phones, instruments or aids that are not permitted;
c. Not enter the examination venue with any inscriptions on any part of the body e.g. palm, arm, thigh, etc. and/or any material if such inscriptions bear relevance to the examination;
d. Not pass or attempt to pass any information from one person to another during an examination;
e. Not act in collaboration with any other candidate(s) or person(s) or copy or attempt to copy from another candidate or engage in any similar activity;
f. Not disturb or distract other candidate(s) during examination;
g. Not be allowed to leave the examination venue until after 75% of the time allocated for that particular paper has expired;
h. Not use other people to sit for the University examination on their behalf;
i. Not smoke in the examination hall;
j. Not be in possession of incriminating material(s) either used or unused during the examination or involved in any other serious examination misconduct including impersonation before, during or after the examination; and
k. Be orderly and abide by rules or guidelines at the centre in the case of CBT examinations.

Any candidate found guilty of these offences; the penalty is EXPULSION.

APPENDIX

Appendix I: List of Reviewers (NUC 70%)

List of Reviewers

Title	Surname	First Name	Institution	Programme
Professor	FABORODE	Michael O.	Obafemi Awolowo University, Ile-Ife	**Discipline Chairman**
Professor	OLOCHE	O. B.	University of Abuja, Abuja	Mechanical Engineering
Professor	EKECHUKWU	Onyemaechi Valentine	University of Nigeria, Nsukka	Mechanical Engineering
Engineer	ALI	Kashim	COREN	Mechanical Engineering & General Discipline
Professor	OLORUNMAIYE	John Adesiji	University of Ilorin,	
Lt. Col. Dr	IMAM	A.S.	Nigerian Defence Academy, Kaduna	Mechatronics Engineering
Professor	ASERE	Abraham	Elizade University, Ilara-Mokin.	Automotive Engineering
Professor	EDOKPIA	Raphael Olumese	University of Benin, Benin-City	Industrial and Production Engineering
Professor	FUBARA-MANUEL	Isoteim	Rivers State University, Port Harcourt	Marine Engineering
Professor	FAKINLEDE	O. A.	University of Lagos, Lagos	Systems Engineering
Professor	OGBONNA	Chibueze Achimba	Babcock University, Ilishan Remo	Computer Engineering
Professor	BOYI	Jimoh	Ahmadu Bello University, Zaria	Electrical Engineering
Professor	ADEDIRAN	Yinusa Ademola	University of Ilorin	Electrical and Electronics Engineering
Professor	AZUBOGU	Augustine Chukwuemeka O.	Nnamdi Azikiwe University, Awka	Electronics Engineering
Professor	NYITAMEN	Dominic Saaityo	Nigerian Defence Academy, Kaduna	Telecommunication Engineering
Professor	LETON	Tambari Gladson	University of Port Harcourt	Environmental Engineering
Professor	ITODO	Isaac Nathaniel	Joseph Sarwan Tarka University, Makurdi	Agricultural and Biosystems Engineering

Professor	OKAFOR	Gabriel Ifeanyi	University of Nigeria Nsukka	Food Science and Technology
Professor	HASSAN	Suleiman Bolaji	University of Lagos, Lagos	Materials and Metallurgical Engineering
Professor	AJAYI	John Ade	Federal University of Technology, Akure	Metallurgical Engineering
Professor	IKHU-OMOREGBE	Daniel	Benson Idahosa University, Benin-City	Chemical Engineering
Professor	ADEMILUYI	Falilat Taiwo	Rivers State University, Port Harcourt	Petrochemical Engineering
Professor	ONYEKONWU	Mike	University of Port Harcourt	Petroleum Engineering
Professor	IKIENSIKIMAMA	Sunday Sunday	University of Port Harcourt	Petroleum and Gas Engineering
Professor	JOEL	Ogbonna Friday	University of Port Harcourt	Petroleum and Gas Engineering
Professor	YELEBE	Zakieni Robert	Niger Delta University, Bayelsa	Natural Gas Engineering
Professor	WAZIRI	Baba Shehu	University of Maiduguri	Water Resources Engineering
Professor	AIYESIMOJU	Kola Oluyomi	University of Lagos	Civil Engineering
Professor	OGUNTI	Erastus O.	Federal University of Technology, Akure	Structural Engineering
Professor	OLUFEMI	Babalola	Federal University of Technology, Akure	Wood Products Engineering
Professor	AISIEN	Felix A.	University of Benin, Benin-City	Biomedical Engineering
Professor	ODETUNDE	Christopher	Augustine University, Illara, Epe.	Aerospace Engineering
Professor	ATAYERO	Aderemi A.	Covenant university, Ota	Information and Communication Engineering
Professor	AIBINU	Musa Abiodun	Federal University of Technology, Minna	Information and Communication Engineering

List of NUC Representatives

Title	Surname	First Name	Programme
Mr	MALLAM	Gambo	Electronics Engineering & Industrial and Production Engineering; Discipline Representative
Mr	WACHUKWU	Obinna	Mechanical Engineering
Mr	OHANME	Bartholomew	Mechatronics Engineering & Petrochemical Engineering
Mrs	EMMANUEL	Chinenye Augustine	Automotive Engineering & Agricultural and Biosystems Engineering
Mr	EMENEM	Chinweokwu	Marine Engineering
Mrs	AKAUBA	Vivian	System Engineering
Mr	AKINOLA	Akinlabi	Computer Engineering
Mr	NWAGWU	James Chile	Electrical Engineering
Miss	ADENIJI	Yemisi	Electrical and Electronics Engineering
Mr	WADA	Arome J.	Telecommunication Engineering
Mrs	ABIMBOLA	Oni	Environmental Engineering
Mrs	OKPEKU	Omoh	Food Science and Technology
Mr	OSEMEKE	Bright	Materials and Metallurgical Engineering
Mr	ZAMUNA	Musa	Metallurgical Engineering
Mr	ADEBAYO	Ibrahim	Mining Engineering/ Aerospace Engineering
Mrs	ZANG	Aara A.	Chemical Engineering
Mrs	EYO	Esther	Petroleum Engineering
Mr	MUHAMMAD	Adam Ibrahim	Petroleum and Gas Engineering (Oil and Gas)
Mr	AHMED	Nakaka	Petroleum and Gas Engineering (Oil and Gas)
Mr	ABORELE	Gabriel	Natural Gas Engineering
Mr	OGUNNUSI	Afolabi	Water Resources Engineering
Mrs	MADU	Happiness Ozichi	Civil Engineering
Mrs	AGBAJI	Stella Ene	Structural Engineering
Mrs	OPARAUGO	Lilian N.	Wood Products Engineering
Mrs	EFFIONG	Itoro	Biomedical Engineering
Mr	NKESHITA	Valentine	Information and Communication Engineering

Appendix II: Senate Committee on 30% Delivery for UNILORIN CCMAS

1. Prof. O. A. Omotesho - Chairman
2. Prof. G. T. Arosanyin - Director, Academic Planning Unit
3. Prof. M. O. Yusuf
4. Prof. L. A. Yahaya
5. Prof. A. C. Tella
6. Prof. A. A. Baba
7. Prof. A. A. Adeoye
8. Prof. Omenogo V. Mejabi

9. Prof. O. A. Lasode
10. Prof. M. S. Ajao
11. Prof. G. B. Adesiji

12. bunoluwa O. Osagbemi
13. Taiwo K. Afolayan
14. A. G. Dauda
15. I. Dauda
16. Omobukola G. Omotoye - Secretary
17. A. A. Lawal - Co-Secretary

Appendix III: Members of the Programme Working Group

1. Prof. G.T. Arosanyin
2. Dr. S. B. Akanbi
3. Dr. A. A. Kilishi
4. Dr. M. F. Ajide
5. Dr. H. A. Yusuf