Michael Okpara University of Agriculture, Umudike.

COLLEGE OF ENGINEERING AND ENGINEERING TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

UNDERGRADUATE HANDBOOK

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CHAPTER ONE

1.0 Introduction

The establishment of Universities of Agriculture in Nigeria in the Nation's educational and developmental history. The Michael Okpara University of Agriculture, Umudike was established in May 1993 with central mandate and mission of imparting agricultural education in. scientific and, practical way, undertaking applied research and such extension services as would assist the achievement of National self-sufficiency in food production as well as catalyzing and sustaining rural and industrial development.

Thus, the University operates unique academic programs in Engineering which are carefully planned to meet the manpower requirements and give flesh to an agricultural revaluation in the country. The program is woven into the overall mandate and mission of the University, taking into consideration all necessary criteria, indicators and peculiarities of the specialized nature of a University of Agriculture.

1.1 History

The establishment of specialized Universities of Agriculture in Nigeria is a milestone in the nation's educational and developmental history. The Michael Okpara University of Agriculture, Umudike was established in May 1993. In due course it became clear that the mission of the Institution could not be properly achieved, neither could Agriculture be successfully developed nor meaningfully utilized in the industrialization and sustenance of the nation without an accompanying College of Engineering. Thus a 2002, the College of Engineering and Engineering Technology came into existence with the establishment of the Department of Agricultural Engineering followed in quick succession by the Departments of Civil Engineering, Mechanical Engineering and Electrical/Electronic Engineering in the 2003/2004 Academic Session, Until October 2006 where the College moved into her own building, the departments we accommodated in the College of Natural Resources and Environmental Management.

The Department of Civil Engineering was therefore established in the 2003/2004 academic session. It is gradually growing in strength by acquiring qualified and highly experienced academic staff and building up its laboratory facilities. The Department runs a five-year program leading to the award of the degree of Bachelor of Engineering (B.Eng.) in Civil, Engineering. The specific contents of the program of the Civil Engineering Department have been updated and enriched to meet current trends in a globalized world through ICT and benchmarks for full accreditation by the National Universities Commission and Council for Regulation Engineering in Nigeria (COREN). Details of the available academic and non-academic personnel resources, as well as laboratory, workshop and classroom facilities are presented at the appropriate sections of this handbook.

1.2 Philosophy:

The philosophy of the Civil Engineering Department, Michael Okpara University of Agriculture, Umudike is to produce graduates of high academic standard with adequate practical and theoretical background of immediate value to the industry and the nation in general. This will help to meet the national goals and objectives. Therefore, the program is geared towards:

1. The development of a thorough practice in training.
2. Early broad-based training in general Engineering and Technology.

3. Practical application of engineering, technology and manufacturing process.
4. Close association of the program with industries in the country.

These include:

a) Common foundation years at 100 and 200 levels for all engineering students.
b) Workshop practice, technology, laboratory work and tutorials.
c) Design projects with bias towards local applications.
d) Broad-based engineering and interaction between student's professionals.
e) Project in the final year on which the student works alone under supervision in specific areas of civil engineering
f) Special skills and in-depth study in a particular area of the program through optional courses or electives.
g) Adequate knowledge in the areas of engineering Management, economics and Law.
h) Six months of supervised industrial training during the second semester of the fourth year.
i) The development of entrepreneurial skills in students.

The academic program has been planned to offer challenges and to encourage the development of ingenuity and originality in the student. The cornerstone of this is an early grounding in the basic engineering sciences and a strong emphasis in Applied Design in the later years.

1.3 Goals and Objectives:

The general aims and objectives of our program are to produce Civil Engineers with competence to meet national needs and aspirations of industrial development and technological emancipation. The training is aimed at not producing white collar sit-in-the office professionals but confident, self-reliant, field engineers who will not only plan, design, construct and maintain civil engineering projects but also would be problem solvers and not liabilities to their employers. They will not only be self-employed but will be employers of labour. We aim at providing our students with sufficient academic background, entrepreneur skills and practical training to enable them to confront the challenges of our developing economy. Engineering practice and to perform optimally in a new world environment ruled by ICT and able to adapt and adopt the advance technology of the Developed countries to solve our local engineering problems.

1.4 The Programme Educational Outcomes (PEOs)

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

The minimum expectations on the graduates of the Civil Engineering Department embodies the PEOs, which are as in Table 1.1.

Table 1.1: Programme Educational Objectives

S/N	PEO
PEO1	Develop entrepreneurial skills and knowledge, with the spirit of self-reliance, so that they can set up their own businesses.
PEO2	Design, develop and produce innovative policies, products, and services for industrial growth and food security in Nigeria.

PEO3	Adapt and adopt indigenous technology in order to solve engineering and technological problems of the Nation.
PEO4	Function effectively both as an individual and as a team member or leader in diverse and in multi-disciplinary settings.
PEO5	Be thoroughly equipped for postgraduate studies.

1.5 Programme Outcomes and Graduate Characteristics

Programme Outcomes refers to the capabilities the graduates of the Programme are expected to acquire from the training provided by the Programme. The programme outcomes of the Department of Civil Engineering of Michael Okpara University of Agriculture Umudike are presented in table 1.2, showing also the relevant graduate characteristics.

Table 1.2: Programme Outcomes and Graduate Characteristics

S/N	Characteristic	Programme Outcome (Engineer Graduate Profile)
PO1	Engineering Knowledge	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in K1 to K4 respectively (see Table 1.3) to develop solutions to complex engineering problems
PO2	Problem Analysis	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development* (K1 to K4)
PO3	Design/ development of sustainable solutions	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required (K5)
PO4	Investigation	Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (K8)
PO5	Modern Tool Usage	Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems (WK2 engineering and K6)
PO6	The Engineer and the World	When solving complex engineering problems, analyse and evaluate sustainable development impacts* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (K1, K5, and K7).
PO7	Ethics	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (K9)
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (K9)
PO9	Communication	Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.

PO10	Project Management and Finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Lifelong learning:	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (K8)
PO12	Adapting Indigenous Technology and Local Materials in the agrarian communities	Apply engineering and technological principles to simplify, facilitate, modernize, and optimize traditional processes and methods in farming, harvesting, and food preservation; ability to employ locally sourced materials in providing engineering and technological solutions.

1.6 Knowledge Attribute Profile

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

Table 1.3: Knowledge Attribute Profile

S/No.	Attribute
K1	A systematic, theory-based understanding of the **natural sciences** applicable to the discipline and awareness of relevant **social sciences**
K2	Conceptually-based **mathematics**, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline
K3	A systematic, theory-based formulation of **engineering fundamentals** required in the engineering discipline
K4	Engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
K5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports **engineering design and operations** in a practice area.
K6	Knowledge of **engineering practice** (technology) in the practice areas in the engineering discipline
K7	**Knowledge of** the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development*
K8	Engagement with selected knowledge in the current **research literature** of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues
K9	**Ethics, inclusive behaviour and conduct**. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

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

1.7 Definition of Complex Problem Solving

The range of complex problem solving which the graduate of the programme must be capable of is defined as follows:

Table 1.4: Range of Complex Problem Solving

Attribute	**Complex Engineering Problems** have characteristic P1 and some or all of P2 to P7:

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

1.8 Definition of Complex Engineering Activities

The range of complex engineering activities is defined in Table 1.5. Complex engineering activities refer to activities or projects that have some or all the characteristics of Table 1.5.

Table 1.5: Range of Complex Engineering Activities

Attribute	**Complex Activities**
Preamble	**Complex activities** mean (*engineering*) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources including people, data and information, natural, financial and physical resources and appropriate technologies including analytical and/or design software
Level of interactions	A2: Require optimal resolution of interactions between wide-ranging and/or conflicting technical, non-technical, and engineering issues
Innovation	A3: Involve creative use of engineering principles, innovative solutions for a conscious purpose, and research-based knowledge
Consequences to society and the environment	A4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based app

1.9 SCOPE:

The scope of our Civil- Engineering program derives from the Definition by the Royal Charter of the Institute of Civil Engineers, London in 1828 as "the art of directing the great source of power in nature for the use and convenience of man". It can also be defined as the planning, design, construction and maintenance of fixed structures, and ground facilities for industries, transportation, use and control of

water or occupancy. It involves analysis, planning and control of water or occupancy. It involves analysis, planning and design of large public works such as transportation systems, water supply systems, pollution control systems, bridges, and dams to improve our environment. In addition, it guarantees a future for the public.

The uniqueness of our program is in the extensive, basic training we give them in the sciences, mathematics s and workshop practice, and to Exposure through our SIWES to Industries and real-life construction work. The academic content of our undergraduate program is to prepare our students for research, further studies and becoming teachers too, most importantly, qualified and experienced professionals are steadily assembled to ensure proper grounding of the studies in the core uses such as hydraulics, structural design, and highway design. Soil mechanics, foundation engineering, project management etc. The interdisciplinary connection of civil engineering with applied sciences and other branches of Engineering is one main reason for the continued widening of the scope of civil engineering.

1.10 CAREER OPPORTUNITIES:

Abundant career opportunities for graduates of Civil Engineering exist in such areas as the construction industries e.g., Buildings, Roads and Highways, Bridges, Dams, Irrigation scheme. Water-ways Harbors, Airports, Sewage, Water resources, drilling in the Oil and Gas Industries. Environmental Engineering, Coastal Protection, Public Health Engineering, Rail road construction, Foundation and soil engineering, Geotechnical engineering, Engineering consultancy services, Surveying-land surveying, Geodesy and Photogrammetry and quantity surveying etc. Job opportunities abound in Government Ministries and Parastatals, private companies, banks, educational institution at all levels. Indeed, the civil engineer is required everywhere because he provides the facilities which serve as vehicle to move services and goods to humanity.

CHAPTER TWO

2.0 ACADEMIC ENVIRONMENT:

To encourage the pursuit of academic excellence, the Department is structured to:

i. Maintain formal classroom 1ectures. Laboratory practical and assignments.
ii. Insists on an oral project defense for final-year students with Computer Power Point presentation,
iii. . Encourage the exhibition of students: design work during the yearly Engineering Week.
iv. Encourage seminars by students before and after going for their SIWES.
v. Encourage seminars by staff and students.
vi. The College Library is open to students during office hours

2.1 ADMISSION REQUIREMENTS

The Department offers a five-year program for the Bachelor of Engineering (B.Eng.) Honours Degree in Civil Engineering. Candidates who have passed the West African Council Examination or Senior Second Certificate Examination (WACE/SSCE) or General Certificate of Education (GCE) or NECO (Ordinary Level) may be admitted into the five programs through a screening test after the JAMB Examination. In addition to the University entry requirements, candidates wishing to be admitted into the Department must fulfill the requirements listed below.

2.1.1 Applicants for admission by UTME must have passed either:

1. The West African Council Examination or Senior Secondary Certificate Examination (WACE/SSCE) with at least five credits in English Language, Mathematics, Physics, Chemistry and one other relevant subject obtained in one or two sittings.

2. At least five papers in the General Certificate of Education (Ordinary Level) passed at not more than two sittings. The subjects must include the four listed in 1 above.

3. At least five papers in the National Examination Council, NECO (Ordinary Level) passed at not more than two sittings. The subjects must include the four listed in 1 above.

4. Senior Secondary School Certificate with at least five credits in English Language, Mathematics, Physics, Chemistry and one other relevant subject obtained in one or two sittings.

2.1.2 Candidates for admission by Direct Entry must have passed:

1. The Higher School Certificate (Principal Level) in Pure Mathematics, Physics and Chemistry. Or
2. The General Certificate of Education (Advanced Level) in the subjects listed in 1 above.

Candidates with recognized and approved level l of National Higher Diploma will be considered for Direct Entry on their individual merits as follows: HIND Upper Credit at 300 level, OND upper Credit at 200 level.

(d) Programme /Sub-Discipline/Deadline Structure to include a period of formal studies in the Universities, industrial Training, Planned site visits and projects.

A total of 9 months of practical training in industry under the Students Industrial Work Experience Scheme (SIWES) is required of all students before graduation. This is broken up into 3 months in the third year of study and 6 months in the fourth year of study.

2.1.3 Admission by Transfer

The University may admit on transfer, a student undergoing an undergraduate degree programme in another recognized university, provided such a student meets the minimum admission requirements of this university and is seeking transfer to a programme similar to the one the student is transferring from. Application for such transfer shall be made on the official application form obtainable from the Academic Affairs Unit or the Registrar's office on payment of the stipulated application fee approved by Senate.

2.2 Period Of Formal Studies In The University

The University runs a two-semester calendar in one session with about 15 weeks. The departmental course of study is structured in such a way that a minimum of 5 years is required. The first year is devoted to preliminary University courses. The second and third-year courses expose the student to some related college courses and basic foundation. College courses, designed to broaden his knowledge and appreciate Engineering. The remaining two years are devoted to specialized courses in the field of Civil Engineering. Year 2 and 3 students are encouraged to go for 3 months' vacation training at the end of the sessions. Year 4 student's under-take a six-month supervised industrial training, from the beginning of Year 4 Second Semester, in places related to their area of specialization. Excursions are under-taken during each academic year. Final year students do projects as a partial fulfillment for the award of B.Eng.

CHAPTER THREE

3.0 DEPARTMENTAL REGULATIONS

3.1 Supplementary/Re-Sit Examination

The University does not operate supplementary or re-sit examinations. Any student who fails any course shall register the course, attend lectures and take examinations on it in the appropriate semester of the next academic year.

3.2 Repeating Failed Courses

Students may be allowed to carry over or repeat failed courses at the next available opportunity subject to the conditions for probation, withdrawal and carrying of minimum and maximum credit unit load per semester as stipulated in this Academic Regulations. No student is allowed to repeat already passed course(s). The minimum grade for a passed course is E (40).

3.3 Students Industrial Work Experience Scheme (SIWES)

i. For any student to qualify for the SIWES Program, his/her CGPA must be at least 1.00 and the number of carry-over courses not more than 15 credit hours.
ii. The SIWES program is strictly for practical work. No student will be allowed to register any other course during the period.
iii. No student is allowed to carry over courses totaling more than 15 credits into SIWES period.

3.4 Probation

Any student whose cumulative grade point average (CGPA) is below 1.00 at the end of any academic year shall be placed on probation for one academic year. If at the end of the period of probation, the student still fails to make the required cumulative grade point average, he will be required to withdraw from the university for one academic year after which he may apply for re-admission. The re-admission is not automatic. In calculating the CGPA of probation year, the student's scores in the previous year are considered along with of the probation year. First year students only (whether or not on probation) may be allowed to repeat the whole session but must apply to senate for approval.

3.5 Pre-Requisite Course

Each student shall be required to pass all lower stage or pre-requisite courses for his programme in order to qualify to register for the next stage or higher-level courses for the programme.

3.6 Withdrawals From The University

Except for academic and health reasons, students may withdraw from the university only after completing one year of study in the university.

3.7 Academic Withdrawal

Any student whose cumulative grade point average is below 1.00 at the end of his year of probation shall be required to withdraw from the university for one academic year after which he may apply for re-admission. The application must be made immediately at the end of the probation. The re-admission of such candidate is not automatic. If re-admitted, the senate may approve that the student changes to another programme where he is qualified. If at the end of the year of re-admission the student still fails to make a cumulative grade point average of 1.00, he shall be required to withdraw permanently from the university.

3.8 Temporary Voluntary Withdrawal
Any student who wishes to withdraw temporarily from the university shall notify the registrar in writing, through his head of department and Dean of College. The period of such voluntary withdrawal, when approved by the senate, shall not exceed on academic year.

3.9 Permanent Withdrawal
Any student who wishes to withdraw permanently from the university shall notify the registrar through his head of department and dean of college, giving a brief reason for the withdrawal and effective date of the withdrawal. The withdrawal becomes effective after approval by the senate.

3.10 Withdrawal On Health Grounds
A student may withdraw, or be asked to withdraw from the university for reasons of ill health certified by the Director of Medical Services of the university. Such student may be re-admitted into the university if he produces medical reports certified by the Director of Medical Services of the University as valid assuring that he is mentally and physically fit for full-time academic work in the university.

3.11 Disciplinary Withdrawal
On grounds of disciplinary action, the Senate, or the Vice Chancellor acting on behalf of the senate to which he shall report for ratification, shall approve the expulsion, rustication or withdrawal of any student.

3.12 Unruly Behaviour
Any student whose behaviour interferes with the smooth conduct and delivery of instructions in class, laboratory or lecture shall be required by the lecturer to withdraw from such class, laboratory or lecture. Refusal by the student shall be regarded as misconduct and reported to the Vice Chancellor through the dean of college for stricter penalty.

3.13 Re-Admission Into The University
Any student who withdraws from the university may apply to the Registrar through his Head of department and dean of college for re-admission within a period not exceeding one academic year from the date the withdrawal was approved by the senate, provided that a student expelled from the university or asked to withdraw permanently from the university on academic grounds shall not be re-admitted or admitted afresh by any means whatsoever into the university.

Every application for re-admission of a student shall be approved by the senate, or the Vice Chancellor who shall report to the Senate for ratification, before the student becomes re-admitted.

3.14 Indebtedness To The University
The university may deny any student who is indebted to it the use of its facilities, which shall include all forms of academic instruction and supervision, the university library, residential accommodation, the laboratories, farms, etc. except with the express approval of the Vice Chancellor, such a student indebted to the university shall not be allowed to register for a further period in the university.

3.15 Academic Advising
Every academic staff in a department shall be involved in academic advising of students, however, the Head of Department may decide to assign the function to some and not all the teaching staff cognizance of the responsibility and teaching loads on each staff. An academic adviser shall look after any student assigned to him through the duration of his course. However, in exceptional cases, changes may be made by the Head of Department. This staff remains the students' set academic adviser for as long as they are students in the Department. Some of the functions of the academic adviser include:

i. Mapping out a programme for the students.
ii. Ensuring effective enrollment of the students during registration.
iii. Checking the academic load of the students with regards to the number of credit hours to be carried per session.
iv. Making sure that the regulations of the Academic Departments and the University arc duly observed by the students, assists students on cases of adding and dropping of courses.
v. Keeping regular office hours for the students to consult with him/her.
vi. Making essential academic appraisals of the students' works.
vii. Consulting with the Dean of Student Affairs office where the student has any psychological problems.

CHAPTER FOUR

4.0 Regulations Governing Degree Programmes

4.1 Period of Registration

All students are required to register for courses in their respective colleges at the beginning of each semester. The normal period allowed for registration is five days from the beginning of the semesters. Late registration will not be entertained. However, in exceptional cases the registrar may permit late registration and the student shall pay late registration fee as stipulated by senate, provided that no student will be registered later than three weeks from the commencement of lectures for the semester. Any student who on account of illness, returns late to campus, he/she may be permitted to register without the payment of the late registration fee, provided his medical report is certified by the University Medical Center.

4.2 Matriculation

It is compulsory for all fresh students to matriculation at a formal ceremony organized by the University. The matriculation ceremony is scheduled for a date after the students' registration and communicated to them appropriately. Every matriculating student shall take the matriculating oath and sign the register.

4.3 Deferment

Students can only defer admissions after matriculation. A candidate who has not matriculated is not permitted to defer admissions.

4.4 Semester System

The university operates the semester system. An academic year is divided into two semesters of about fifteen weeks each. Students shall register for approved courses in each semester and be examined in them at the end of the semester.

4.5 Attendance at Classes, Practical, Examinations

Attendance at classes, practical, laboratories and examinations are compulsory. Proper records of attendance shall be kept by the college/departments. No student will be allowed to write any examination unless he is properly registered for the course being examined and also his attendance at the lectures/practical/laboratories is evaluated to be up to 80%. Before the commencement of examinations, the registrar shall forward to the college the list of students registered for the various courses to be examined.

4.6 Continuous Assessment

The continuous assessment shall be practiced in all courses. This shall normally constitute 30% of the final grading for the course for the semester. The continuous assessment shall comprise tests, quizzes, term papers and essays/projects as may be approved by the College Board of Examiners.

4.7 Minimum And Maximum Credit Unit Load Per Semester

Each student shall carry the minimum semester credit unit load of 15 units and a maximum of 24 units as approved by the senate for the courses mapped out for the programme. Normally, no student shall be allowed to carry a semester credit unit load in excess of that approved by the senate for his/her programme. Any exception to this provision shall be referred to the Senate for consideration and appropriate decision. However, the following guidelines shall be applied in considering any student's request to the senate for carrying a semester credit unit load in excess of that specifically approved by the senate for the student's programme.

Table 4.1 Prescribed Cumulative Grade Point Average and Approved Corresponding Excess Credit Unit Load.

Cumulative Grade Point Average (CGPA)	Excess Credit Unit Load Per Semester
i) 3.50 and above	i) 3 Credit Units
ii) 3.00 – 3.49	ii) 2 Credit Units
iii) 2.00 – 2.99	iii) 1 Credit Unit
iv) Below 2.00	iv) Nil

4.8 Grading Systems

The examination of students on the programme is carried out on continuous assessment in addition to examination at the end of each semester. Thus, 30% for quizzes, tutorials, homework, tests, etc., and 70% for written examinations lasting a minimum of 1 hour for one credit hour course. A student must have attended at least 75% of lectures to be eligible to write the semester final examination. In 'addition, he /she must have done class assignments and tests for continuous assessment to a final grade on the subject. Examination done without Continuous Assessment will earn a student a grade of Failure (F) regardless of a score made over 70%.The student shall be examined and graded under the following scheme shown in Table 4.2.

Table 4.2

SCORE (%)	GRADE	POINT (GP)	DESCRIPTION
70- 100	A	5	EXCELLENT
60-69	B	4	VERY GOOD
50-59	C	3	GOOD
45- 49	D	2	FAIR
40- 44	E	1	PASS
39- BELLOW	F	0	FAIL

4.9 Graduation and Standard of Degree

A student is expected to score a minimum of 40% total in his final year of study in the programme. However, this is governed by the finals with respect to the degree of classifications shown in Table 4.3 below.

Table 4.3

CGPA	CLASS OF DEGREE
4.50-5.00	1st class Degree
3.50-4.49	2nd class upper
2.40-3.349	2nd class lower Degree
1.50-2.49	3rd class Degree
1.00-1.45	Pass Degree

Less than 1.00	Fail

4.10 Qualification for Final Year Status And Registration For Undergraduate Project

i. A student should not take or register project course if he/she does not attain final year status.
ii. An undergraduate student attains final year status if after registering the maximum credit load for a session (50-54) including the project he/she has no more courses outstanding to register.
iii. Attaining of final year status is assessed at the beginning of the session.
iv. Once a student attains final year status and thereafter registers projects, he/she should be examined along with the colleagues whether or not all the courses registered in the session are passed.
v. Head of department is responsible for assigning project supervisors to final year students in the department.
vi. As much as possible, part-time lecturers are exempted from supervising student's projects at the undergraduate level.

4.11 REQUIRED PASSING GRADE FOR GRADUATION

Each student shall be required to obtain at least a final cumulative grade point average of 1.0 in order to qualify for graduation. The student must, in addition, obtain a passing grade in all major required ancillary, general studies and elective courses registered and satisfy the required minimum aggregate credit units for his programme.

4.12 ADDING AND DROPPING OF COURSES

Students may be permitted to complete the approved forms obtained from the Dean's office to add/or drop any course during the first two weeks of the commencement of lectures on the course. Students who wish to drop courses must complete the approved forms obtained from the Dean's office. The completed forms shall be returned to the Registrar's office through the college officers. Normally, adding or dropping of course may not be allowed later than four weeks from the commencement of lectures.

4.13 CARRY OVER COURSE

i. It is compulsory that all registered courses be passed before students could graduate.
ii. Students must try as much as possible to clear backlog of courses before proceeding to higher level courses.
iii. Student may be allowed to carry – over courses into the final year provided they meet the CGPA and pre-requisite course requirements.

4.14 CHANGE OF DEGREE PROGRAMME

Students are not allowed to change their degree programme until a full academic year is completed in the University. Application for change of degree programme could be made on the official application form obtained from the Register's office. The Registrar may convey approval for the change of a degree programme on the concurrent agreement of the departments and colleges involved and senate shall be informed. Where a student is permitted to change his degree programme, the change may prolong his period of study in the University. Any course taken in his former department which are relevant to the new department shall be decided by the head of department based on the relevance to the new department.

CHAPTER FIVE

5.0 STUDENT'S WELFARE

Handling of Academic Grievances.

The University has set out procedures for handling academic grievances of students and these are listed in the academic regulations, which each in the first instance, petition the Registrar through the Head of his Department. Registrar will then refer the petition to the College Board examinations, the recommendations of the College Board are sent to the Dean of the College offering the course for a review. In the case of final year Senate through the Senate Examinations Committee for ratification for review of answer scripts is required to pay a stipulated amount of money per paper. Photocopies of the script to be reviewed, with all the comments of the original marker removed, are now for review, to one external examiner for final year papers and two internal examiners for non-final year paper's The reviewers must not have participated in the original marking of the scripts. Submission of a petition by an aggrieved student must be received within two months of the official publication of the results. Other academic grievances may be channeled to the Head of Department through the student's staff adviser and if the Head or Departmental Board cannot handle the matter it is referred to the Dean of the College and the College Board and if it is still not possible to handle the matter, it is then referred to the Senate.

5.1 Students Association

There is a student association by name **'Nigerian Institution of Civil Engineers Student's Affiliate'**, on admission, each student automatically becomes a member after Registration hence, membership is therefore compulsory. The aim of the Association is to foster cordial relationship among members. to assist them enroll into professional organizations as well as the improvement of their general welfare. The following offices exist President, Vice President, Secretary General, assistant Secretary General, Financial Secretary, Treasurer, PRO, Director of Socials, and Provost. Elections into these offices hold annually. The association also has a staff adviser.

5.1.1 Membership

Membership is compulsory for all undergraduate students of the Department. Each student member is expected to pay the annual dues at the commencement of a new academic session. They are also entitled to receive the association's constitution, Almanac and the Association's sticker.

5.3 Activities

Activities are organized in line with the Associations aims and objectives. These activities include environmental awareness campaigns, send forth/welcome parties, excursion/field trips, seminars, workshop etc.

5.4 Affiliation

The Association is affiliated to the National body of the Nigerian Institute of Civil Engineers Students Affiliate, NICE'SA.

CHAPTER SIX

6.0 REVISED COURSE OUTLINE FOR CIVIL ENGINEERING AS APPROVED BY CURRICULUM COMMITTEE, CIVIL ENGINEERING:

5. COURSE OUTLINE: 100 LEVEL

100 LEVEL - FIRST SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
GET 111	Engineering Society	1	C	15	-
CHM113	General Chemistry I	2	C	30	-
CHM114	General Practical Chemistry I	1	C	-	45
MTH 112	Elementary Mathematics I	2	C	30	-
PHY 111	General Physics III	2	C	30	-
PHY 112	General Physics I	2	C	30	-
PHY 117	General Practical Physics I	1	C	-	45
STA 112	Probability 1	3	C	45	
GST 111	Communication in English	2	C	15	45
GST 112	Nigerian Peoples and Culture	2	C	30	-
LIB 116	Use of Library	1	C	15	-
IGB 111	Basic Igbo Literacy	1	C	15	-
*FRE 114	Elementary French I	1	E	15	
*GER 115	Elementary German I	1	E	15	-
	Total	**20**		**285**	**135**
100 LEVEL - SECOND SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 121	Introduction to Civil Engineering	2	C	30	-
GET 121	Design Thinking and Innovation	1	C	15	
GET 122	Engineering Graphics & Solid Modeling I	2	C	15	45
GET 123	Engineering Laboratory I	1	C	-	45
CHM121	General Chemistry II	2	C	30	
CHM124	General Practical Chemistry II	1	C	-	45
MTH122	Elementary Mathematics II	2	C	30	-
MTH 123	Elementary Mathematics III	2	C	30	-
PHY121	General Physics IV	2	C	30	
PHY 122	General Physics II	2	C	30	-
PHY 127	General Practical Physics II	1	C	-	45
ENG 121	Use of English	1	C	15	
IGB 121	Readings and Practice in Igbo	1	C	15	-
*FRE 124	Elementary French II	1	E	15	
*GER 125	Elementary German II	1	E	15	-
	Total	**20**		**240**	**180**

***E= Elective**

200 LEVEL

200 LEVEL - FIRST SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 211	Civil Engineering Drawing	2	C	15	45
GET 211	Applied Electricity I	3	C	30	45
GET 213	Engineering Mathematics I	3	C	45	-
GET 214	Applied Mechanics	3	C	45	-
GET 215	Students Workshop Practice	2	C	15	45
GET 216	Fundamentals of Thermodynamics	3	C	45	-
ENT 211	Entrepreneurship and Innovation	2	C	30	-
GST 217	Philosophy, Logic and Human Existence	2	C	30	-
	Total	**20**		**240**	**90**
200 LEVEL - SECOND SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 221	Concrete Technology	2	C	15	45
GET 221	Computing and Software Engineering	3	C	30	45
GET 222	Engineering Materials	3	C	45	-
GET 223	Engineering Mathematics II	3	C	45	-
GET 224	Strength of Materials I	3	C	45	-
GET 225	Fundamentals of Fluid Mechanics	3	C	45	-
GET 226	Electrical and Electronics Engineering Laboratory	1	C	-	45
GET 227	Engineering Laboratory II	1	C	-	90
*GET 299	SIWES 1	3	C	9 WEEKS	
	Total	**19**		**225**	**225**

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

300 LEVEL

300 LEVEL-FIRST SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 311	Fluid Mechanics	3	C	45	45
CEE 312	Structural Mechanics I	2	C	30	-
CEE 313	Soil Mechanics I	3	C	15	-
GET 311	Engineering Statistics and Data Analytics	3	C	45	-
GET 312	Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies	3	C	45	-
GET 313	Engineering Mathematics III	3	C	45	-
GET 314	Engineering Laboratory III	1	C	-	45
ENT 312	Venture Creation	2	C	15	45
GST 312	Peace and Conflict Resolution	2	C	45	-

	Total	**22**		**260**	**135**
300 LEVEL-SECOND SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 321	Engineering Survey and Photogrammetry 1	2	C	15	45
CEE 322	Design of Structures	2	C	30	-
CEE 323	Civil Engineering Materials	2	E	30	45
CEE 324	Engineering Geology	2	E	15	45
CEE 325	Strength of Structural Materials	2	C	30	-
GET 321	Engineering Economics	3	C	45	-
GET 322	Technical Writing and Communication	3	C	45	-
GET 323	Engineering Mathematics IV	3	C	45	-
GET 324	Renewable Energy Systems and Technology	3	C	30	45
*GET 399	SIWES 1I	3	C	9 WEEKS	
	Total	**22**		**310**	**135**

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

400 LEVEL

400 LEVEL-FIRST SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 411	Engineering Survey and Photogrammetry II	3	C	30	45
CEE 412	Principles of GIS and Remote Sensing	2	C	30	-
CEE 413	Reinforced Concrete Design	2	C	30	-
CEE 414	Numerical Methods and Operations Research	2	C	30	-
CEE 415	Engineering Hydraulics	2	C	15	45
CEE 416	Highway Engineering	2	C	30	-
CEE 417	Water Resources and Environmental Engineering I	2	C	30	-
CEE 418	Soil Mechanics II	2	C	30	-
	Total	**17**		**240**	**45**
400 LEVEL-SECOND SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 421	Civil Engineering Laboratory	1	C	0	90
GET 421	Engineering Project I	2	C		90
GET 422	Engineering Valuation and Costing	2	C	30	-
*GET 299	SIWES I	3	C	9 weeks	
*GET 399	SIWES II	4	C	12 weeks	
*GET 499	SIWES III	4	C	12 weeks	
	Total	**16**	**C**	**30**	**180**

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

500 LEVEL

500 LEVEL-FIRST SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 511	Engineering Hydrology	2	C	30	45
CEE 512	Theory of Plates and Shells	2	E	30	-
CEE 513	Water Supply and Waste Water Engineering	2	E	30	-
CEE 514	Drainage and Irrigation Engineering	2	C	30	-
CEE 515	Design of Steel and Timber Structures	2	C	30	-
CEE 516	Traffic Engineering	2	E	30	-
CEE 517	Foundation Engineering	2	C	30	-
CEE 518	Modern Transportation Engineering	2	C	30	-
CEE599	Project	6	C	-	90
GET 511	Engineering Project Management	3	C	45	-
GET 512	Engineering Law	2	C	30	-
	Total	**17**		**255**	**135**
500 LEVEL-SECOND SEMESTER					
Course Code	**Course Title**	**Units**	**Status**	**LH**	**PH**
CEE 521	Construction Engineering	3	C	45	-
CEE 522	Public Health Engineering	1	C	30	-
CEE 523	Highway/Transportation Engineering II	2	E	30	-
CEE 524	Dynamics of Structures	2	C	15	45
CEE 525	Structural Mechanics II	2	E	30	-
CEE 526	Water Resources and Environmental Engineering II	2	E	30	-
CEE 527	Geotechnical Engineering	2	E	30	-
CEE599	Project	6	C	-	90
GET 521	Engineering Management	3	C	45	-
	Total	**17**		**180**	**90**

CEE599 credited in the 2nd Semester of 500-Level. Do at least 1 elective in each semester

6. COURSE SYNOPSIS

100 Level

GET 111: Engineer in Society (1 Unit C: LH 15)
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.

CHM 113: General Chemistry I (2 Units C: LH 30)
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 114: General Practical Chemistry I (1 Unit C: PH 45)
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.

MTH 112: Elementary Mathematics I (Algebra and Trigonometry) (2 Units C: LH 30)
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.

PHY 111: General Physics III (Behaviour of Matter) (2 Units C: LH 30)
Course Contents
Heat and temperature, temperature scales; gas laws; general gas equation; thermal conductivity; first Law of thermodynamics; heat, work and internal energy, reversibility; thermodynamic processes; adiabatic, isothermal, isobaric; second law of thermodynamics; heat engines and entropy, Zero's law of thermodynamics; kinetic theory of gases; molecular collisions and mean free path; elasticity; Hooke's law, Young's shear and bulk moduli; hydrostatics; pressure, buoyancy, Archimedes' principles; Bernoulli's equation and incompressible fluid flow; surface tension; adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 112: General Physics I (Mechanics) (2 Units C: LH 30)

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 117: General Practical Physics I (1 Unit C: PH 45)

Course Contents

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

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

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.

GST 111: Communication in English (2 Units C: LH 30)

Course Contents

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

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 and Corruption (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

LIB 116: Use of Library (1 Unit C: LH 15)

Course Content

Introduction and Historical Background of Libraries: Evolution and significance of libraries, the role of libraries in education and research, The Michael Okpara University of Agriculture, Umudike Library system. Types of Libraries and Their Resources: Academic, public, special, and national libraries, Print and non-print materials, Digital and electronic resources. Library and Education: The relationship between libraries and academic success, Role of the library in self-directed learning, Enhancing research and innovation through libraries. Library Study Skills: Note-taking and summarization techniques, Effective reading and comprehension strategies, Time management for academic success. Library Resources and Organization: Structure of an academic library, Arrangement and classification of resources, The role of librarians in information management. Using Library Resources: Print and Electronic: Accessing books, journals and reference materials, Digital libraries and online repositories, Utilizing institutional e-learning resources. Library Search, Cataloguing and Classification Schemes: The Dewey decimal classification (DDC), The Library of Congress Classification (LCC), OPAC (Online Public Access Catalogue) and other search tools. Databases and Digital Research Tools: Introduction to academic databases (e.g., Google Scholar, JSTOR, ResearchGate, etc.), Open access journals and institutional repositories. Evaluating sources for credibility and reliability. Research Writing and Academic Techniques: Structuring academic papers and reports, Formulating research questions, Literature review techniques. Bibliographic Citation and Referencing Methods: APA, MLA, Chicago, and Harvard citation styles, Managing citations with software tools (e.g., Mendeley, Zotero, EndNote), The importance of proper referencing in academic writing. Plagiarism and Academic Integrity: Understanding plagiarism and its consequences, Techniques for paraphrasing and summarizing, Ethical considerations in research. Copyright Laws and Intellectual Property Rights: Understanding copyright regulations, Fair use policies and restrictions, Copyright implications in academic research. Conducting Internet and Web-Based Research: Effective internet search strategies, evaluating online sources for accuracy and reliability. The role of artificial intelligence and search engines in research

IGB 111: Basic Igbo Literacy (1 Unit C: LH 15)

Course Contents

Igbo alphabets, Parts of speech: Nouns and pronouns, Parts of speech: Preposition and conjunctions, Parts of speech: Adjectives, Adverbs and verbs, Interrogatives, numerals and exclamation, Phrases and tones, Clauses, Affixation, Punctuation marks, Sentence types, Morphemes, Igbo literature: Teaching of Igbo culture, Igbo songs and poetry.

FRE 114: Elementary French I (1 Unit *E: LH 15)

Course Contents

French Culture and Civilization: Importance of French language in Nigeria, Overview of Francophone countries and their relationship with Nigeria. Knowledge of France: Introduction to France's history and major major cities, Contribution of France to Development of Science, Technology and Agriculture; Medicine and biology; Physics, chemistry and engineering; Agriculture, clothing and Food processing; Mathematics; Arts, communication and Computers; Philosophy. AGRICULTURE (L'AGRICULTURE): Position of France in agricultural produce, Definition of some related agricutral terms, QuelquesverbesutilisentdansL'agriculture (Some verbs used in agriculture), Les outils et machines agricols (Some agricultural tools and machines), Some Educational terms in English and French, Some French verbs associated with education, Informatique et la technologied'information, Verbs associated with ICT. ENGINEERING (GENIE): Genie Chimique (Chemical Engineering), Genie Electrique (Electrical Enginnering), Mechanical Engineering (Genie Mecanique), GénieCivile (Civil Engineering), Les sciences naturelles, Physiques et Appliques (Natural, Physical and Applied Sciences), La Santé et La Médicine (Health and medicine), L'Economie (Economics), Le Tourisme (Tourism). INTRODUCTION A LA PHONETIQUE (INTRODUCTION TO PHONETICS: The French Alphabet and accents, Spellings and pronunciation, Classroom pronunciation practice. LES SALUTATIONS ET FORMULES DE POLITESSE (GREETINGS AND POLITE REMARKS: Common greetings and self-introduction, Asking about Someone's wellbeing, Introduction of Self and others, (Metiers/Professions) Occupation/professsions, Introducing someone (Presenter quelqu'un), Nationality, Address, place and Date of birth, Countries and their nationals, (residential Address) Domicile, (Place of birth) lieu de naissance, Les nombres: cardinaux et ordinaux (Numbers : cardinal and ordinal), (Telling time, Day, Month, Year, and date) Dire L'heure, Les jours, Les mois et les années). LES OBJETS UTILISESS DANS LA CLASSE, ARTICLES, GENRES, PREPOSITIONS (OBJECTS USED IN THE CLASSROOM, ARTICLES, GENDER AND PREPOSTIONS

GER 115: Elementary German I (1 Unit *E: LH 15)

Course Contents

Introduction to German Language, Pronunciation of German alphabets and special characters (ä, ö, ü, ß), Personal pronouns and auxiliary verbs (sein, haben, werden). Greetings and Personal Information, Common greetings and self-introduction, Asking and answering personal details (name, age, nationality, profession). Numbers, Dates and Time, Counting from 0 to 1 billion, Ordinal numbers and telling time, Days, months, seasons and their significance in agriculture. Articles, Nouns, and Cases, Definite and indefinite articles, Singular and plural forms, Basic introduction to nominative, accusative, dative and genitive cases.

CEE 121: Introduction to Civil Engineering (2 Unit C: LH 15)

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.

GET 121: Design Thinking and Innovation (1 Unit C: LH 15)

Course Contents

Introduction to Design and Problem Solving in Engineering. Principles of Teamwork and Collaboration in Design. Breaking down complex Engineering problems. The Engineering Design Process: From Need to Concept. Problem Definition and Stakeholder Analysis. Brainstorming, Ideation, and Concept Selection. Modeling and Prototyping Techniques (Sketching, CAD, Simulations).Team Presentations

on Concept Development. Systems Thinking and Integration in Mechatronic Design. Design Thinking suite of methods and techniques applied to project lifecycles with an emphasis on interdisciplinary practice. Ethical and Social Impact of Engineering Solutions. Final Project Work and Peer Feedback. Final Team Presentations and Design Review.

GET 122: Engineering Graphics and Solid Modelling I (2 Units C: LH 15; PH 45)

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.

GET 123: Engineering Laboratory I (1 Unit C: LH 15 PH 15)

Content

Introduction to Laboratory Practices, Safety Procedures, and Report Writing. Measurement Techniques and Error Analysis (Length, Mass, Volume, Time, Temperature).Use of Vernier Calipers, Micrometers, and Multimeters. Force, Equilibrium, and Vector Analysis. Newton's Laws and Friction. Oscillations and Simple Harmonic Motion. Ohm's Law and Series/Parallel Circuits. Kirchhoff's Laws and Network Theorems. Basic Data Acquisition: Introduction to Sensors and Arduino. Arduino IDE installation and basics. Hydrostatic Pressure and Bernoulli's Principle. Stress-Strain Relationship. Thermal Conductivity and Heat Loss. Basic Signal Measurement: Oscilloscope and Signal Generator Use. Overview of robotics components. DC motor and servo motor control using motor drivers (e.g., L298N).Final Report Submission and Review.

CHM 121: General Chemistry II (2 Units C: LH 30)

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 124: General Practical Chemistry II (1 Unit C: PH 45)

Course Contents

Continuation of CHM 107. Additional laboratory experiments to include functional group analysis, quantitative analysis using volumetric methods.

MTH 122: Elementary Mathematics II (Calculus) (2 Units C: LH 30)

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 123: Elementary Mathematics III (Vectors, Geometry and Dynamics) (2 Units C: LH 30)

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 121: General Physics IV (Vibration Waves and Optics) (2 Units C: LH 30)

Course Contents

Simple harmonic motion (SHM). Energy in a vibrating system. Damped SHM. Resonance and transients. Coupled SHM. Q values and power response curves. Normal modes. Waves (types and properties of waves as applied to sound).Transverse and longitudinal waves (superposition, interference, diffraction, dispersion, polarization).Waves at interfaces (energy and power of waves).The wave equation.2-D and 3-D wave equations. Wave energy and power. Phase and group velocities. Echo and beats. The Doppler-effect. Propagation of sound in gases, solids and liquids and their properties.

Optics: Nature and propagation of light. Reflection and refraction. Internal reflection. Scattering of light. Reflection and refraction at plane and spherical surfaces. Thin lenses and optical instruments. Wave nature of light. Dispersion. Huygens's principle (interference and diffraction).

PHY 122: General Physics II (Electricity and Magnetism) (2 Units C: LH 30)

Course Contents

Forces in nature. Electrostatics (electric charge and its properties, methods of charging).

Coulomb's law and superposition. Electric field and potential. Gauss'slaw. Capacitance. Electric dipoles. Energy in electric fields. Conductors and insulators. DC circuits (current, voltage and resistance). Ohm's law. Resistor combinations. Analysis of DC circuits. Magnetic fields. Lorentz force. Biot-Savart and Ampère's laws. Magnetic dipoles. Dielectrics. Energy in magnetic fields. Electromotive force. Electromagnetic induction. Self and mutual inductances. Faraday and Lenz's laws. Step up and step down transformers. Maxwell's equations. Electromagnetic oscillations and waves. AC voltages and currents applied to inductors, capacitors, and resistance.

PHY 122: General Practical Physics II (1 Unit C: PH 45)

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.

ENG 121: Use of English (1 Unit C: LH 15)

Course Contents

Vocabulary Development: Exploring registers and levels of usage in different fields such as medicine, military, communication, marketing, Law, Literature, Agriculture and Sciences, Direct and indirect speech. Figures of speech: Understanding and application of smile, metaphor, personification, apostrophe, metonymy, synecdoche, hyperbole, climate, euphemism, irony, paradox and oxymoron. Writing Skills: Letter writing - formal, informal, semi- formal, Essay writing, Report writing, Article writing, letters to editors and speech writing techniques. Book Review: A literary book will be assigned at the beginning of the semester. Discussions and reviews to be guided by the instructor. Oral Communication: Introduction to Phonetics and Phonology. ii)Classification of speech sounds: vowels and consonants. Understanding syllables: mono- syllabic, di- syllabic and multi - syllabic words. Mastering stress and intonation patterns. This course is structured to provide students with essential English language skills necessary for academic success and professional communication in their respective disciplines.

IGB 121: Readings and Practice in Igbo (1 Unit C: LH 15)

Course contents

Essay writing, Figures of speech, Traditional literature, Written literature, Translations and Dictionaries in Igbo, Test, Igbo indigenous knowledge, Speech writing, Comprehension, poetry or drama, Research in Igbo within the university, Using computer to write Igbo.

FRE 124: Elementary French II (1 Unit *E: LH 15)

Course Contents

LES VERBES ET LES ADVERBES FRANCAIS (FRENCH VERBS AND ADVERBS). CONSTRUCTION DES PHRASES FRANCAISES (FRENCH SENTENCE CONSTRUCTION). Introduction to essential verbs (être, avoir, aller, aimer). Present tense conjugation and sentence construction. Sentence Formation and Communication. EXPRIMER LES ACTIVITES QUOTIDIEN (DAILY ACTIVITY EXPRESSIONS. -Sentence Formation and Communication. Using adjectives, pronouns, and common expressions. Everyday vocabulary and basic sentence structures. Engaging in basic conversations and describing daily activities. LES ADJECTIFS POSSESSIFS (POSSESSIVE ADJECTIVES).

GER 125: Elementary German II (1 Unit *E: LH 15)

Verbs – Modal, Separable and Inseparable. Modal verbs and their applications. Separable and inseparable verb prefixes. Family, Professions and Descriptive Adjectives. Vocabulary for family structures. Identifying professions and their gender forms. Adjective declension and sentence construction. The Human Body, Colors and Opposites. Naming body parts and their functions. Understanding and using colors in different contexts. Common antonyms and contrasting words.

200 Level

CEE 211: Civil Engineering Drawing (2 Units C: LH 15; PH 45)

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.

GET 211: Applied Electricity I (3 Units C: LH 30; PH 45)

Course contents

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

GET 212: Engineering Graphics and Solid Modelling II (2 Units C: LH15; PH 45)

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 213: Engineering Mathematics I (3 Units C: LH 45)

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 214: Applied Mechanics (3 Units C: LH 45)

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 analyses.

GET 215: Students Workshop Practice (2 Units C: LH 15; PH 45)

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 216: Fundamentals of Thermodynamics (3 Units C: LH 45)

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.

ENT 211: Entrepreneurship and Innovation (2 Units C: LH 30)

Course Contents

The concept of entrepreneurship (entrepreneurship, intrapreneurship/corporate entrepreneurship); theories, rationale and relevance of entrepreneurship (Schumpeterian and other perspectives, risk-taking, necessity and opportunity-based entrepreneurship, and creative destruction); characteristics of entrepreneurs (opportunity seeker, risk-taker, natural and nurtured, problem solver and change agent, innovator and creative thinker); entrepreneurial thinking (critical thinking, reflective thinking and creative thinking). Innovation (The concept of innovation, dimensions of innovation, change and innovation, knowledge and innovation). Enterprise formation, partnership and networking (basics of business plan, forms of business ownership, business registration and alliance formation, and joint ventures). Contemporary entrepreneurship issues (knowledge, skills and technology, intellectual property, virtual office and networking). Entrepreneurship in Nigeria (biography of inspirational entrepreneurs, youth and women entrepreneurship, entrepreneurship support institutions, youth enterprise networks and environmental and cultural barriers to entrepreneurship).Basic principles of e-commerce.

GST 217: Philosophy, Logic and Human Existence (2 Units C: LH 30)

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, etc.

CEE 221: Concrete Technology (2 Units C: LH 15; PH 45)

Course Description:

Introduction to concrete, its components and use. Chemical admixtures applied to concrete. Properties of fresh concrete, Properties of hardened concrete. Test methods- Concrete mix design. Quality control Transportation, policing, co-proofing of concrete and joints in concrete construction. Special concrete. Ready mix concrete, fiber-reinforced concrete, precast concrete and high-performance concrete.

Practical skills to be developed include

1. Select the proper method of analysis
2. Measure the quantities accurately
3. Handle instruments properly

4. Analyze given data
5. Interpret the results

Semester work shall consist of experiments covering physical tests on cement, mix design of normal concrete mixes, and workability tests. Compressive strength of concrete using test cubes and cylinders. Non- destructive test (NOT).

GET 221: Computing and Software Engineering (3 Units C: LH 30; PH 45)

Course Contents

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

GET 222: Engineering Materials (3 Units C: LH 45)

Course content

Crystal structure of selected specimen (BCC, FCC, HCP).Crystal imperfection. Determination of solidification curve of selected metals. Heat treatment processes (annealing, normalizing. Heat treatment processes hardening & tempering. Microstructural examination of mild steel. Comminution devices. Pneumatic conveying system for solids. Use of cyclone to separate solids from air stream. Introduction to different types of screening equipment Determination of the thermal conductivity of a metallic rod. Determination of the thermal conductivity of an insulating powder. Determination of the thermal conductivity of a solid by the guarded hot plate method. Verification of the Stefen-Boltzmann constant for thermal Conductivity. Mechanical test: Impact test, Tensile test, Hardness test, Fatigue test, Creep and non-destructive test of engineering materials, testing of magnetic materials e., g. transformer cores, testing of insulators, cables and transformers coil, and verification of P-N junction characteristics. Tensile tests on bars, Determination of young's modulus of rigidity of materials of close coiled helical spring and stiffness of spring adiation. Proximate Analysis and determination of the calorific value of coal and coke using Bomb Calorimeter. Mechanical test: Impact test, Tensile test, Hardness test, Fatigue test, Creep and non-destructive test of engineering materials, testing of magnetic materials e., g. transformer cores, testing of insulators, cables and transformers coil, and verification of P-N junction characteristics. Tensile tests on bars, Determination of young's modulus of rigidity of materials of close coiled helical spring and stiffness of spring, composite materials, corrosion testing, entropy change during reversible and irreversible processes using heat exchanger.

GET 223: Engineering Mathematics II (3 Units C: LH 45)

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 224: Strength of Materials (3 Units C: LH 45)

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 225: Fundamentals of Fluid Mechanics (3 Units C: LH 45)

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 226: Electrical and Electronic Engineering Laboratory (1 Units C: PH 45)

Course Contents

Resistance measurement; Condition for maximum power transfer; inductance and capacitance measurement; verification of network theorems; ac series circuits. Measurement of power and power factor, excitation of dc generator, load characteristics of a separately excited dc motor; open and short circuit tests for a transformer. Static characteristics of junction diode and transistor, Half and full wave rectification, determination of copper temperature coefficient by Wheatstone bridge, measurement of voltage, current, and power in three phase star/delta connection, simple domestic installation practices.

GET 227 Engineering Laboratory II (1 Unit C: PH 45)

Course Contents

Crystal structure of selected specimen (BCC, FCC, HCP). Crystal imperfection. Determination of solidification curve of selected metals. Heat treatment processes (annealing, normalizing). Heat treatment processes hardening and tempering. Microstructural examination of mild steel. Commination devices. Pneumatic conveying system for solids. Use of cyclone to separate solids from air stream. Introduction to different types of screening equipment. Determination of the thermal conductivity of a metallic rod. Determination of the thermal conductivity of an insulating powder. Determination of the thermal conductivity of a solid by the guarded hot plate method. Verification of the Stefen-Boltzmann constant for thermal conductivity. Mechanical test: Impact test, Tensile test, Hardness test, Fatigue test, Creep and Non-destructive test of engineering materials, testing of magnetic materials e.g. transformer cores, testing of insulators, cables and transformers coil and verification of P-N junction characteristics. Tensile tests on bars. Determination of young's modulus of rigidity of materials of close coiled helical spring and stiffness of spring. Radiation resistant spring. Proximate analysis and determination of the calorific value of coal and coke using Bomb Calorimeter. Composite materials, corrosion testing, entropy change during reversible and irreversible processes using heat exchanger.

GET 299: Students Industrial Work Experience I (3 Units C: 9 weeks)

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, etc. (8-10 weeks during the long vacation following 200 level).

300 Level

CEE 311: Fluid Mechanics (3 Units C: LH 30; PH45)

Course Contents

Types of fluid flow. Fluid statics: Floatation and stability. Dynamics of fluid flow - conservation equation of mass and momentum. Euler and Bernoulli's equations. Introduction to incompressible viscous flow. Application of Bernoulli's equation to fluid measurement, pitot tubes, orifices, nozzles, venturimeters, weirs, notches and rate meter. Types of machines, impulse and reaction turbines; Pelton wheels; Francis Turbines. Unit speed, unit discharge, unit power performance characteristics of pumps and turbines. Specific speed multi-stage pumps. pumping and piping. Dimensional analysis using Buckingham Pi theorems. Potential viscous flow and shear forces in pipes and between parallel plates. Reynolds number, laminar and turbulent velocity distribution, laminar flow between parallel plates and through circular tubes, boundary layers and separation. Drag and lift.

LABORATORY PRACTICALS: Reynolds experiment, Calibration of V-notch, Orifice meter, Venturimeter, Bernoulli's, experiment, Flow in single pipes. Unsteady flow in pipes with special emphasis on water hammer and use of surge tanks. Pressure estimation on sphere, cylinder, flow visualization, Wall friction. Minor pipe losses. Equation for radial pressure variation. Radial flow. Free vortex flow. Forced vortex flow. Secondary flow in beds. Flow measurements. Flow meters and errors in measurement.

CEE 312: Structural Mechanics I (2 Units C: LH 45)

Course Contents

Introduction to statically determinate and indeterminate structures, geometrical redundancy, geometrical constraints, primary system, degree of geometrical redundancy. Analysis of determinate structures - beams, trusses; structural analysis theorems, graphical methods; application to simple determinate trusses for reactions, shear force, moments and deflections. Advanced topics in bending moment and shear force diagrams in beams, Arches, Frames and compression bridge structures. Theory of bending of beams and deflection of beams. Unsymmetrical bending and shear centre and applications. Strain energy. Biaxial and triaxial state of stress. Transformation of stresses. Mohr's circle. Springs. Creep, fatigue, Fracture, stress concentration and failure theories. Influence lines for statically determinate structures: beams, trusses and arches. Theorem of three moments and Claperon's method of indeterminate structures.

LABORATORY PRACTICALS: Analysis of elastic line of statically determinate beams. Determination of reactions in simple portal frame (Compression bridges) and three pinned arch. Shear Centre Determination. Determination of deflection of cantilever bent in a plane which is not symmetrical. Experimental stress analysis; mechanical and optical strain measuring devices. Electrical strain gauges' photo elastic strain measurement. Brittle coating

CEE 313: Soil Mechanics I (3 Units: LH 30; PH 45)

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.

GET 311: Engineering Statistics and Data Analytics (3 Units C: LH 45)

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 312: Introduction to Artificial Intelligence, Machine Learning and Convergent Technologies (3 Units C: LH 45)

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 313: Engineering Mathematics III (3 Units C: LH 45)

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 314: Engineering Laboratory III (AI driven IoT& Data Analytics) (1 Unit)

Introduction to IoT, AI, and Data Analytics: Concepts and Trends. IoT Architecture and Protocols (MQTT, HTTP, CoAP).Sensors, Actuators, and Embedded Platforms (Arduino, ESP32, Raspberry Pi).Data Acquisition, Signal Conditioning, and Streaming. Cloud and Edge Computing for IoT. Introduction to Machine Learning: Concepts and Tools (Python, Scikit-learn). Supervised Learning: Regression and Classification on IoT Data. Unsupervised Learning: Clustering, Anomaly Detection. Real-Time Analytics and Dash boarding (Node-RED, Grafana, Power BI). AI at the Edge: TinyML, TensorFlowLite, Model Deployment on Microcontrollers. Case Studies: Smart Homes, Healthcare, Predictive Maintenance. IoT Security, Data Privacy, and Ethical Considerations. Project Planning and System Design. Final Project Development and Testing. Final Project Presentation and Demonstration.

ENT 312: Venture Creation (2 Units C: LH 15; PH 45)

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).

GST 312: Peace and Conflict Resolution (2 Units C: LH 45)

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.

CEE 321: Engineering Surveying and Photogrammetry I (2 Units C: LH15; PH45)

Course Contents

Introduction to theory and practice of land surveying. Distance: linear measurement and correction. Chain surveying techniques-ranging, taping etc., Compass surveying-direction of local attractions and adjustments problems based on intersection and radiations. Leveling instruments and leveling techniques-height of instrument method and the rise and fall methods. Geodetic levelling - errors and their adjustments. Applications. Tachometry - Methods: Substance heighting. Self-adjusting and electromagnetic methods. Introduction to longitudinal cross section, contour and their uses. Traversing; Temporary adjustments- Bowditch and the transits methods of reduced bearing and whole circle bearing. Use of hand operated and electronics machines. Application of traversing to setting out of funnels pipe lines etc. Leveling; Errors in Engineering leveling. Geodetic (precise) leveling collimation errors and adjustments. Bandwith methods of adjusting lines of levels. Application to setting out of sewer using boning rod etc. Tacheometry; Tachometry methods for incline lines of sights. Topographic

mapping; Substance heighting (but not including simultaneous reciprocal observations) study of self-reducing tachometer and Electromagnetic distance measuring equipment.

LABORATORY PRACTICAL: Chain surveying exercise, Compass traverses, running lines of levels and elementary sectioning and theodolite tasks. Practicals in field surveying related to Engineering projects. Location and setting out of works, roads, bridges, railways, tunnels, pipelines and buildings. Hydrographic surveying. Compass traverse, running lines of levels, sectioning and use of Theodolite.

CEE 322: Design of Structures I (2Unit C: LH 30)

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 323: Civil Engineering Materials (3 Units C: LH 30; PH 45)

Course Contents

Introduction to Civil Engineering Materials: Concrete technology; Manufacture and properties of cement, aggregates and their properties; types of cement; properties of fresh and hardened concrete. Concrete mix design. Properties and their determination. Effects of water/cement and aggregate/cement ratios on strength of concrete; Steel technology- production, fabrication and properties, corrosion and its prevention. Test on steel and quality control. Timber technology – types of wood, properties, and uses of timber. Defects in timber. stress grading. Preservation and fire protection. Timber products. Rubber, plastics, asphalt, tar, glass, lime pricks mud etc. Bituminous material, properties and uses. Soils, formations, exploration and sampling of soils, brick work and block work, Polymers in Civil Engineering practice. Application of civil engineering materials to buildings, roads and bridges.

LABORATORY PRACTICALS:

Various tests on cement, specific gravity of construction materials, destructive and non-destructing tests for concrete, test on timber structures, characteristics strength test for steel.

CEE 324: Engineering Geology (2 Units C: LH 30)

Course Content

Introduction. Scope and subdivision of geology, relevance to civil engineering, origin and evolution of the planets, the earth and its relation to the sun and other planets. Rocks and minerals. Stratigraphy - time scale - fossils and their importance: special reference to Nigeria. Introduction to geology of Nigeria. Engineering Applications - Water supply, site investigation - Dams, Dykes, etc. The core, the mantle and the crust, composition of the various layers. Radioactivity and magnetism of some rocks and minerals. Geological processes. Exogamic processes. (Weathering and erosion) Endogenic processes. Magma- its origin, crystallization differential; and solidification into rocks-earthquakes, volcanoes rifting and continental drifts. Folding, faulting, jointing and rifting. Isostasy, changes in static sea levels, causes and effects; transgression and regression tectonic and sedimentation. Historic geology and stratigraphy. Geological time scale. Fossils, type of unconformities; and fossils records in Nigeria's sedimentary rocks. Introduction to the geology of Nigeria: the basement complex, the cretaceous and younger sedimentary rocks. Major soil types and their distribution. Mineral resources of the earth: properties of minerals; minerals types, fossil fuels, organic minerals, non-metallic minerals resources of Nigeria with particular emphasis on origin of petroleum. Physical state of hydrocarbons, migration, accumulation and exploitation. Minerals in the economy of Nigeria.

LABORATORY PRACTICALS: Study of geological map, physical properties of minerals, Rocks identification, folding, faulting.

CEE 325: Strength of Structural Materials (2 Units C: LH 30)

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.

GET 321: Engineering Economic (3 Units C: LH 45)

Course Content:

The nature and scope of economics. Basic concepts of engineering economy- Relationship between Science, Engineering, Technology and Economics. Theories of Maximization-Profit Maximization, Growth Maximization, Sales Revenue Maximization, Utility Maximization and Wealth Maximization. Theory of Demand-Demand schedule, Nature and characteristics of demand, Law of demand, Limitations to the law of demand, Elasticity of Demand: Price, Income and Cross elasticity, Demand Forecasting definition, factors determining demand forecasting, methods of demand forecasting. Cost Concepts-Types of costs: Fixed cost, Variable cost, Average cost, Marginal cost, Real cost, Opportunity cost, Accounting and Economic cost, Cost - Volume profit analysis, Break - Even analysis, Operating leverage. Interest formulae, discounted cash flow, present worth, equivalent annual growth and rate of return comparisons. Replacement analysis. Benefit-cost analysis. Minimum acceptable rate of return. Acccounting Concepts-Double Entry system, Journal, Ledger, Trail balance, Final Accounts Book Keeping system, Depreciation - Definition, functions, methods of depreciation; Straight line, Declining balance; Sum of years digits method. Judging attractiveness of proposed investment.

GET 322: Technical Writing and Communication (3 Units C: LH 45)

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 323: Engineering Mathematics IV (3 Units C: LH 45)

Course Contents

Series solution of second order linear differential equations with variable coefficients. Bessel and Legendre equations. Equations with variable coefficients. Sturm-Liouville boundary value problems. Solutions of equations in two and three dimensions by separation of variables. Eigen value problems.

Use of operations in the solution of partial differential equations and Linear integral equations. Integral transforms and their inverse including Fourier, Laplace, Mellin and Handel Transforms. Convolution integrals and Hilbert Transforms. Calculus of finite differences. Interpolation formulae. Finite difference equations. Runge-Kutta and other methods in the solutions of ODE and PDEs. Numerical integration and differentiation.

GET 324: Renewable Energy Systems and Technology (3 Units C: LH 30; PH 45)

Course Contents

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

Practical Contents

Simple measurement of solar radiation, bomb calorimeter determination of calorific value of fuels and biomass; measurement of the velocity of wind, waves and the energy that abound in them; laboratory production of biogas and determination of energy available in it; simple conversion of solar energy to electricity; trans-esterification 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 399: Students Industrial Work Experience II (4 Units C: 12 weeks)

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:

1. Design of machine components;
2. Product design and innovation;
3. Part modelling and drafting in Solid Works; and
4. Technical report writing.

400 Level

CEE 411: Engineering Surveying and Photogrammetry II (3 Units C: LH 30; PH 45)
Course Contents
Topographic maps/plans; Basic principles of contour and contouring, Further work on contours and contouring - methods of contouring, contour interpolation and uses of contour plants and maps, areas and volumes. Direct and indirect method of contouring. Setting out of engineering works. Elementary topographical surveying. Elements of Photogrammetry, photogrammetric equipment, errors of measurements and contour interpolation. Uses of contour maps/plans e.g. to determine areas and column of reservoirs and locate proposed routes. Setting out of Engineering works: Basic principles of setting out. Method of setting out various Engineering works- Base lines, sewers, laying the pipes, bridges, reference mark curves (horizontal and vertical) vertical alignment (controlling vertical in multi-storey building, transferring height from the floor to floor) setting out of building lines, roads, and highways. Monitoring of structures, control of excavating process. Construction surveying; Basic principle of construction surveying. Explanation of various surveying works involved in the construction of highways, streets, railways, canal, pipelines, tunnels, bridges, sites, dam etc. Photogrammetry. Mass-haul diagrams. Area and volume of earthworks. Determination of areas by approximate methods-calculating areas from coordinates, from triangle and area of irregular boundary (trapezoidal method). Volume of earthworks; the prismoidal method, volume from road profile, volume from irregular cross-section from sport heights and volume from contour maps. The prismatic correction. Elements of photogrammetry.

LABORATORY PRACTICALS: Photogrammetry equipment and errors of measurement. Identification of features in air photographs, viewing of photographs with pockets and mirror stereoscopes plotting of site plans by bearings and distance and from coordinates by use of AutoCAD and MICROSTATION SE Software. Applications.

CEE 412: Principles of GIS & Remote Sensing (2 Units C: LH 30)
Senate-approved relevance to mission, vision, strategic goals, uniqueness, and contextual peculiarities of the University
Course Contents
Electromagnetic radiation and interaction with matter. Types and design of electromagnetic sensors. The photographic camera, Radiometers, thermal scanners, and multispectral scanners. Sensor platforms. Introduction to digital image processing. Image classification. Elements of photo interpretation. Definitions and Basic concepts of GIS (Geographical Information System).Spatial relationships. Elementary Mathematical concepts (graph theory, set theory, and topology). Components of a GIS. Field-based and object-based concepts of the real world. Raster and vector databases. Spatial Data Models: 2D, 3D, and 4D Model; tessellation data models; vector data models, tessellation versus spatial vector relationships: metric, topologic and spatial order. Data quality aspect: positional accuracy, attribute accuracy, logical consistency, completeness, and lineage. Data capture; data manipulation; data queries, data analysis; data modelling; data display and data presentation.

CEE 413: Reinforced Concrete Design (2 Units C: LH 30)

Course Contents

Fundamentals of design process, properties of reinforced concrete materials building regulations, materials selection and codes of practice. Design philosophy, elastic design: limit state designs in concrete, principle of modular ratio and load factor method. Theory of design of basic structural reinforced concrete elements for bending and shear using ultimate strength design methods. Design of beams and slabs for flexure, shear, anchorage of reinforcement, and deflection. Design of columns for axial force and foundation base and bending schedule.

CEE 414: Numerical Methods and Operations Research (2 Units C: LH45)

Course Contents

Operations Research, Optimization models, Methodology for modeling real-life problems into mathematical programs - Examples and applications, Linear, Integer, Network, and Nonlinear Programs - Algebraic modeling - Algebraic modeling software - Optimization software, Optimization methods, Outcomes of optimization problems - Graphical solution of optimization problems - The improving search paradigm - Local and global optima - Convexity - Enumeration methods - Commercial solvers, Nonlinear Programming, Review of calculus (gradient, Hessian, Taylor expansion) - Improving feasible directions - Optimality conditions (necessary and sufficient) for unconstrained and constrained problems - Finding initial feasible solutions - Iterative methods for optimization problems – Convexity, Linear Programming, Modeling strategies and assumptions for linear programs - Graphical solutions to linear programs - Polytopes - Extreme points and extreme rays - Simplex algorithm - Convergence of Simplex - Degeneracy - Primal and dual bounds for Linear Programming - Duality theory - Sensitivity analysis and post-optimal analysis, Network Programming, Introduction to networks - Modeling strategies and assumptions for network programs - Total unimodularity - Shortest path - Dijkstra's algorithm - Maximum flow modeling - Ford-Fulkerson algorithm - Max-Flow-Min-Cut Theorem – Matching, Integer Programming, Modeling strategies and assumptions for Integer Programs - Difficulty of Integer Programs – Graphical solutions of IPs - Total enumeration - LP relaxations - Rounding techniques - Divide-and-Conquer schemes - Branch-and-Bound - Cutting Planes.

CEE 415: Engineering Hydraulics (2 Units C: LH 30)

Course Contents

Pipe Networks. Branching pipes. Hardy cross method of pipe network analysis. Computer application in the development of pipe network analysis. The use of Excel, Matlab and other commercial pipe network software like EPANET. Water hammer and surges in pipe flow network.

Fundamental concepts of fluid flow. Laminar and turbulent Flow. Boundary layer separation Lift and Drag. Stream function, velocity potential application to flow Nets. Steady and Unsteady flow in a closed conduit. Uniform flow open channels: open channel, uniform flow, hydraulic mean depth, hydraulic gradient, broad-crested weir and centurial flume, force equation, best hydraulic section. Non-uniform flow in open channels: energy equation for open streams, specific energy, critical velocity and critical depth, hydraulic jump, backwater curves. Surge waves. 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. Hydraulic model. Purpose of models, laws of similitude, types of models and practical model scales, Sediment transport formulae, "land drainage and inland navigation problems. Definition of hydrology. Hydrologic cycle and components. Precipitation, radiation, wind, evaporation, transpiration, infiltration, percolation, runoff, catchment and watershed characteristics.

Measurements of hydrologic cycle components. Water balance equation with worked examples. Surface water hydrology.

LABORATORY PRACTICALS: Performance curves of pumps and turbines; Unsteady flow in surge chamber. Friction losses in pipes and fittings; Measurement of flow velocity/discharge in laboratory flumes; Measurement of incipient motion of particles in laboratory.
Determination of Reynolds numbers at different flood rates in laminar/turbulent flow phenomena, to determine unsteady flow in surge chambers, to conduct model studies in a wind tunnel.

CEE 416: Highway Engineering (2 Units C: LH 30)
Course Contents
Introduction – general transportation systems. Highway economic and financing. Road classification. Highway location survey. Earthwork calculations. Geometric design of highways including intersections. Axle load surveys and calculation of traffic loads. Soil engineering aspects of highways-compaction soil stabilization. Pavement materials and laboratory tests. Pavement structures and design. Highway drainage and design, highway maintenance. Airport engineering-classification of airports and aircraft characteristics. Airport terminology, planning and design of airports. Airports-introduction to railway engineering. Location surveys and alignment, railroad structures and design.

CEE 417: Water Resources And Environmental Engineering2 Units C: LH 15; PH 45)
Course Contents
Engineering economy in water resources planning. Drainage. Hydrograph analysis, reservoir and flood routing, and Hydrological forecasting. Hydraulic structures, etc. Dams, dykes, weirs, docks and harbour, spillways, stilling basins, man-holes Mid coastal hydraulic structures etc. Board crested: Weir-calibration, discharge coefficients. Sharp-crested weir, venture flumes. Hydraulic jump and backwater curves, scour behind bottom revetment and around bridge piers, instability of sorts due to groundwater flow, experiment with laminar flow table. Basic water and wastewater sampling and analysis – Dissolved oxygen, BOD, COD, Hardness, Nitrogen (Kyeldah and organic), iron and manganese, plate count coliform group.

CEE 418: Soil Mechanics II (3 Units C: LH 30; PH45)
Course Contents
Formation of soils, soil deposits, soil properties. Soil and water relationship – void ratio, porosity, specific gravity and other factors. Soil classification. Atterberg limits – particle size distribution. Flow of water in soils – seepage and permeability and ground waterflow.

LABORATORY PRACTICAL: Laboratory soil tests include classification, permeability and index tests: liquid limit, plastic limit, Atterberg limits. Determination of specific gravity, void ratio, porosity, particle size distribution, direct shear, triaxial, and consolidation tests. Soil classification test: Insitu density tests compaction and C.B.R. tests, identification of rock and rock materials physical and engineering properties or rocks. Terzaghi Bearing capacity, identification and physical properties. Soil survey and soil map study.

CEE 421: Civil Engineering Laboratory (1 Unit C: LH 0; PH 90)
Course Content
Identify Highway and Traffic Components: Traffic Survey Techniques: Manual and automated traffic counts (volume, speed, classification). Road Inventory Survey: Identify and document road elements

(carriageway, shoulders, medians, signage, pavement markings). Intersection Components: Study of types (T, Y, cross, rotary), control devices (signals, signs), and pedestrian facilities. Field Visit / Virtual Tour: Examine an actual road or simulate highway elements using videos or CAD software. Use of GPS and GIS in Road Mapping: Map a small section of road using GPS and overlay on GIS software to identify components. Design Geometric Components of Highways: Horizontal Curve Design: Calculate radius, length of curve, and set out a simple circular curve using theodolite or total station. Vertical Curve Design: Use given grades to design summit and valley curves, and plot their profiles using CAD or graphing tools. Cross-Section Design: Design and draw the typical cross-section of a highway with shoulders, medians, drainage. Sight Distance Analysis: Determine SSD, OSD, and ISD on a road segment and evaluate field data accordingly. CAD Software Application: Use AutoCAD Civil 3D or similar for drafting alignments and geometric elements. Evaluate Strength of Construction Materials: Aggregate Crushing Value Test: Determine the strength of aggregates used in road construction. Los Angeles Abrasion Test: Assess the hardness and wear resistance of aggregates. CBR Test (California Bearing Ratio): Measure the subgrade strength for pavement design. Bitumen Testing: Penetration, ductility, and softening point tests for road bitumen. Concrete & Cement Testing: Compression strength test of concrete cubes, initial and final setting time of cement. Apply the Optimization of Strength of Materials: Concrete Mix Design Lab: Optimize mix ratios for different grades of concrete (using IS/ACI methods). Compaction Test: Proctor test to optimize moisture content for maximum soil compaction. Flexural Strength of Beams: Conduct flexural strength tests on beams and analyze the effects of reinforcement. Tensile and Compression Testing: Use UTM (Universal Testing Machine) to test different materials (steel, concrete, etc.) under load. Non-Destructive Testing (NDT): Rebound hammer or ultrasonic pulse velocity test to assess in-situ concrete strength.

GET 499: Students Industrial Work Experience III (8 Units C: 24 weeks)

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.

GET 421 Engineering Project I (2 Units C: PH 90)

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 422 Engineering Valuation and Appraisal (2 Units C: LH 30)

Course Contents

Objectives of valuation work/valuer's primary duty and responsibility. Valuer's obligation to his or her client, to other valuers, and to the society. Valuation methods and practices.
Valuation reports. Expert witnessing. Ethics in valuation. Valuation standards. Price, cost and value. Depreciation and obsolescence. Valuation terminology. Real asset valuation; personal asset valuation. Machinery and equipment valuation. Oil and gas facilities valuation. Mines and quarries valuation. Appraisal reporting and review.

500 Level

CEE 511: Engineering Hydrology (2 Units C: LH 30; PH 45)

Course Contents

Hydrological cycle, rainfall, and measurement of rainfall and analysis of rainfall, evaporation: measurement of evaporation, formulae and theories, their use and applications. Infiltrations: The role of infiltration in hydrological cycle, infiltration as factor of runoff and as recharge of ground water, comparison of methods of estimating infiltration. Drainage basins and hydrographs monthly and annual runoff relations, characteristics of drainage basin and hydrograph analysis. The unit hydrograph: Basic principles, unit hydrographs for various durations, derivation of unit hydrographs from complex storms, synthetic unit hydrograph. Flood routing: routing in a simple reservoir stream flow. Routing, frequency and duration studies. Hydraulics of wells, groundwater investigations and exploration for water. Groundwater and Aquifers: Physical Properties of Aquifers. Darcy's Law and Hydraulic conductivity. Well Flow Systems: Measurement of hydraulic conductivity, Transmissivity, Specific yield and storage coefficient. Groundwater Exploration, well construction and pumping. Mathematical Techniques – Analytical and numerical solutions and simulation. Digital Computers – Finite Difference and Finite Element techniques in groundwater modelling. Unsaturated Flow. Surface – Subsurface water relations. Computer Aided Design in Water Resources.

CEE 512: Theory of Plates and Shells (2 Units E: LH 30)

Course Contents

This course covers classical theories related to coordinates and vector formulations, along with fundamental engineering applications. The focus is on comprehending the geometrical load-carrying properties of plate and shell structures, as well as interpreting numerical solutions. It addresses numerical methods such as the Rayleigh-Ritz technique, along with theories for both small and large deflections of plates. The course explores stresses and deformations in shell elements and applies Kirchhoff assumptions to thin plate theory. Additionally, it includes membrane bending theories of thin shells and analyzes plates and shells through both classical and refined plate theories to tackle static and dynamic issues.

CEE 513: Water Supply and Waste Water Engineering (2 Units C: LH 30)

Course Contents

The relationship between water and wastewater is crucial, especially concerning public health and waterborne diseases. Key components of water chemistry play a significant role in this context. Treatment methods are implemented for both surface water and groundwater. Fundamental design principles are essential for creating water supply treatment and distribution systems, which encompass storage, pumping, and piping. Wastewater originates from various sources, and surveys can differentiate between industrial and domestic wastewater. Understanding wastewater involves microbiological elements, as well as the design and processes involved in its collection, treatment, and disposal. There are also options and alternatives for reusing wastewater, alongside effluent standards that must be followed. In terms of sewage, important considerations include the quantity and quality of sewage, identifying crucial parameters for measurement. Planning, designing, constructing, and maintaining

sewage systems are essential tasks. Treatment processes for sewage include various unit operations, as well as non-conventional methods such as sewage farming, waste stabilization ponds, aerated lagoons, and oxidation ditches. Disposal methods for sewage can be either water-dependent or independent. Effective water pollution control measures are necessary, along with assessing the quantity and quality of solid waste, including methods for collection, transportation, and disposal. Institutional frameworks must be established for efficient management, particularly concerning toxic and hazardous waste.

CEE 514: Drainage and Irrigation Engineering (2 Units E: LH 30)

Course Contents

Land classification: crop water requirements; Crop: irrigation requirements; farm delivery requirements; diversion requirements; soil water relationships; movement of soil moisture; measurement of infiltration and soil Moisture. Irrigation water quality. Irrigation planning criteria. Irrigation methods; supplemental irrigation, irrigation structures. Design, construction, operation and maintenance of surface, sub-surface and sprinkler irrigation systems. Surveys and investigation – sources of water, soils and salinity. Water tables; drainage structures. Subsurface drains. Design criteria – Drain size, materials used; installation of subsurface drains; urban storm drainage. Land drainage.

CEE 515: Design of Steel and Timber Structures. (2 Units C: LH 30)

Course Contents

Introduction to building codes. Fundamentals of load and resistance factor design of steel elements. Design of tension and compression members. Composite design and construction in steel and reinforced concrete; design of structural foundations: pre-stressed concrete design. Modern structural form: tall buildings lift shafts and shear walls, plate girders, crane girders, stanchions in multi-storey building, fire, and corrosion protection devices, system buildings: design projects. Simple connection design. Introduction to computer modelling methods. Timber design; allowable stresses, types of joint, fluid timber members, timber beams and trusses. Laboratory tests on structural elements in concrete, timber and steel, Computer Aided Design of structures. Exercises on design and detailing of connections, basic structural elements in steel and timber.

CEE 516: Traffic Engineering (2 Units E: LH 30)

Course Contents

Study of fundamental operational solutions to traffic problems, followed by a theoretical study of traffic stream flow and its parameters: fundamentals of highway signals and marking; signal system types and their design and operation. Studies of intersection gap acceptance flow density relationships, shock. An in-depth study and analysis of conventional and emerging public transportation state of the art systems. Brief review of conventional transportation systems, study of bus rapid systems, demand responsive bus systems, personal rapid transit, dual mode, guide way and automated freeway systems and high speed rail TACV systems. Review of current transportation administration. Systems research and demonstration programmes.

CEE 517: Foundation Engineering (2 Units C: LH 30)

Course Contents

Review of soil bearing capacity; consolidation and settlement. Design of shallow and deep foundations, earth pressure design, and types of retaining walls and functions. Design of gravity, cantilever, buttress and counterfort retaining walls. Design of footings, combined footing and raft foundation, design of footing subjected to moments, floating foundations. Pile foundations and pile load tests, design of pile foundations and piles subjected to lateral loads, Batter piles, Caissons and pile caps. Design of

foundation structures – design and detailing of footings, combined footing raft foundations, piles sheet pile walls. Slope stability, soil structure interaction and the design of flexible bulkheads. Anchor system for various earth structures. Seepage and surcharge effects. Site investigation.

CEE 518: Modern Transportation Engineering (2 Units C: LH 30)

Course Contents

An in-depth study and analysis of conventional and emerging public state-of-the-art systems. The concept of planning and design of such system as waterways, air transportation, harbor and dock engineering, railway transportation and pipeline transportation. A brief review of conventional transportation systems, a study of bus rapid systems, demand responsive bus systems, personal rapid transit, dual mode, guide way and automated freeway systems and high-speed rail TACV systems. Review of current transportation administration. Systems research and demonstration programs.

GET 511: Engineering Project Management (3 Units C: LH 45)

Course Contents

Project management fundamentals – definitions, project environment, nature and characteristics, development practice, management by objectives, and the centrality of engineering to projects, infrastructures, national and global development. The scope of project management – organizational, financial, planning and control, personnel management, labour and public relations, wages and salary administration and resource management. Identification of project stakeholders; beneficiaries and impacted persons – functions, roles, responsibilities. Project community relations, communication and change management. Project planning, control and timeliness; decision making, forecasting, scheduling, work breakdown structure (WBS), deliverables and timelines, logical frameworks (log frames), risk analysis, role of subject matter experts (SMEs), role conflicts; Gantt Chart, CPM and PERT. 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 512: Engineering Law (2 Units C: LH 30)

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 521: Water Resources and Environmental Engineering II (2 Units E: LH 30)

Course Contents

Introduction to public health engineering – the sanitary engineer's role, characteristics of water and wastewater, (physical, chemical and biological characteristics), Water supply, treatment and design. Wastewater collection, treatment, disposal and design. Solid waste collection, treatment, disposal and design of systems. Air pollution and control. 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.

CEE 522: Public Health Engineering (1 Units C: LH 30)

Course Contents

This course covers the fundamentals of sanitary engineering, focusing on the structure and growth of microorganisms along with sterilization and culture techniques. Students will explore water usage and the diseases related to water. Understanding the physical, chemical, and biological characteristics of water and wastewater, including their measurement and significance. Examination of appropriate technologies for water supply and treatment processes, including coagulation, storage, filtration, disinfection, and distribution. Onsite sanitation practices, with a focus on designing and managing various non-waterborne sanitation systems, such as traditional pit latrines and improved latrines. Study of waterborne sanitation systems relevant to the Nigerian context, including vaults, cesspools, septic tanks, and pour-flush toilets, alongside wastewater treatment strategies. Analysis of the sources and effects of pollution, along with water quality standards and control measures. Overview of air pollution agents, their effects, and control methods. Financial management and operational principles of PHE systems. Study of water supply systems, including abstraction, storage, pumping, distribution, and network analysis. Definition of water quality standards and the scientific basis for designing unit processes in water treatment. Understanding urban drainage systems, including hydraulic principles, rainfall management, storm water collection, and combined sewer systems. Defining wastewater systems, understanding sewage characteristics, and meeting effluent quality requirements. Treatment processes such as primary sedimentation, activated sludge systems, biological filters, and sludge treatment and disposal. Exploration of water sources, health implications, and waterborne diseases. Analysis of water quality through physical, chemical, microscopic, bacteriological, and radiological methods. Flow diagrams for treating surface and groundwater, covering preliminary treatment, screening, coagulation, flocculation, and sedimentation. Techniques including slow sand, rapid sand, and pressure filtration, as well as disinfection, water softening, and removal of iron and manganese. Principles of designing water supply, treatment, and distribution systems, including storage requirements. Identification and survey of sources of wastewater, encompassing both industrial and domestic origins.

Laboratory Practical:

Students will engage in hands-on laboratory practicals to determine various water quality parameters, including:

1. Color, taste, odor, and pH levels

2. Total alkalinity and hardness (including calcium hardness and CO2 levels)
3. Concentrations of iron, magnesium, sulphate, and chloride in water.

CEE 523: Highway/Transportation Engineering II (2 Units E: LH 30)

Course Contents

Highway planning and traffic survey. Origin and destination studies, purpose, zoning, cordon, and internal surveys, are processing survey data. Introduction to trip generation and attraction, trip distribution, modal split and route assignment. Intersection design, types of at-grade and grade-separated intersections, assessment of intersection capacity, conflicts at intersection. Traffic management; traffic signal timing, vehicle actuation, elementary signal systems, delay studies and one-way street, design of signal timing, other traffic control systems, signs and line markings. Parking control. The management of traffic and design of traffic signals. Parking. Geometric design. Construction methods. Construction material and laboratory tests.

CEE 524: Dynamics of Structures (2 Units E: LH 30)

Course Content

This course structure emphasizes the integration of theoretical knowledge with practical applications, to enhance the understanding of dynamic behavior in various structural systems considering basic principles of motion and forces, Newton's laws and their application to structures, Equations of motion for particles and rigid bodies. Free and forced vibrations of single-degree-of-freedom (SDOF) and multiple-degree-of-freedom (MDOF) systems, Damped and undamped systems, Frequency response functions and resonance (Natural frequencies and mode shapes).Types of dynamic loads (seismic, wind, impact), Static vs. dynamic analysis, Response spectra and their applications in seismic design, Time history analysis, Impulse response and transfer functions. Formulating equations of motion for SDOF and MDOF systems using Lagrange's equations, Matrix methods for dynamic analysis, Finite element methods for complex structures. Numerical integration methods (Newmark, Runge-Kutta), Time history analysis and response simulations, nonlinear dynamic analysis. Modal analysis and modal superposition method, Experimental modal analysis techniques, System identification methods. Deriving the equation of motion for an SDOF system subjected to an external force, Calculating natural frequencies and mode shapes of a simple beam using the Rayleigh method, Analyzing a multi-story building under seismic excitation using response spectrum analysis, Solving a time history analysis problem for a structure subjected to an earthquake record.

Laboratories: Hands-on experience with dynamic testing and data acquisition.

CEE 525: Structural Mechanics II (2 Units C: LH 30)

Course Contents

Analysis of stress and strain, phenomenological material behaviour, extension, bending, and transverse shear stresses in beams with general cross-sections. Analysis of truss, beam and frame structures using matrix methods; matrix force methods; matrix displacement method; analysis concepts based on theorem of least and virtual work in structural analysis. The analysis of framed structures, planar and 3D using beam-column elements and shear walls and floors. Flexibility and stiffness analyses performed by generating the matrices and carrying through the analyses step by step with a matrix manipulator program. Computer applications. Advanced topics in statically indeterminate continuous Frames, Arches and Compression bridges.

CEE 526: Construction Engineering (3 Units C: LH 30)

Course Contents

This entails earth-moving activities, machinery, capital investment, and operational expenses. It also includes formwork design, assembly of components, enhancing productivity and construction techniques, safety measures, project financing, insurance and bonding, and contractual agreements. Additionally, it addresses solutions for challenges faced on construction sites and in engineering projects, particularly in the context of buildings and heavy construction in Nigeria.

CEE 527: Geotechnical Engineering (2 Units E: LH 30)

Course Contents

Engineering geology. The behavior of rocks and soil in building and engineering construction, foundations, tunnels, dams and flood control work with reference to the importance of the mineral composition of earth and rock materials, their geomorphic and geological features and their stress history. Field investigation. Earth structures (earth dams) and slope stability, the choices of type of dam design, construction and control of dams, embankments and slopes. Principles of dams design, explorations, construction and materials, stability analysis, deformation prediction, groundwater control, construction procedures and equipment. Foundations subjected to dynamic forces. The initial and long-term stability of earth-retaining structures. Rock mechanics: introduction to rock mechanics, mining engineering, and rock excavation, drilling and blasting techniques.

CEE 599: Project (6 Units C: PH 270)

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.

GET 521: Engineering Management (3 Units C: LH 45)

Course contents

Essence of management task. Patterns of leadership. Creating a viable organization. Productivity and motivation, organizing task. The span of control and the delegation of authority. Organizational theory and concepts. Industrial safety. Industrial relations. Technology innovation and sustainability: Change, Risk, Logistic and Supply Chain management. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction and quality improvement by facility and process redesign and systems integration. Operational specialties integration in a project consulting firm. Group technology tasks involve designing, planning and implementing an engineering project to stimulate students' multidisciplinary teams' working ability or application of industrial engineering tools in evaluating and solving any practical organizational problem.

CHAPTER SEVEN

7.0 ACADEMIC AND NON-ACADEMIC STAFF

7.1 List of Academic Staff

S/N	STAFF NAME	SEX	DESIGNATION	ACADEMIC
1.	Engr. Dr. Kennedy Chibuzor Onyelowe	M	Associate Professor	Academic Staff
3.	Engr. Prof. Gregory Chukwuemeka Ezekpube	M	Professor	Academic Staff
4.	Engr. Dr.Ben Uchechukwu Ngene	M	Associate Professor	Academic Staff
5	Engr. Dr. Jude Iloabuchi Obianyo	M	Associate Professor	Academic Staff
6	Engr. Dr. Ugochukwu Nnatuanya Okonkwo	M	Associate Professor	Academic Staff
7	Engr. Dr. Obiekwe Anizoo Ubachukwu	M	Senior Lecturer	Academic Staff
8	Engr. Dr. Emmanuel Emeka Arinze	M	Senior Lecturer	Academic Staff
9	Engr. Dr. Festus Chukwdi Onyeka	M	Senior Lecturer	Academic Staff
10	Engr. Dr. Hyginus Obinna Ozioko	M	Senior Lecturer	Academic Staff
11	Engr. Mariagoritta Ifeoma Jideofor	F	Lecturer I	Academic Staff
12	Engr. Henry Kene Ugwanyi	M	Lecturer I	Academic Staff
13	Engr. Ogechi Chika Ikpemo	M	Lecturer I	Academic Staff
14	Engr. Evaristus Emeka Ohazurike	M	Lecturer I	Academic Staff
15	Mr. Dandy Chukwudike Akoma	M	Lecturer II	Academic Staff
17	Engr. Uzoma Iro	M	Lecturer II	Academic Staff
18	Engr. Jesuborn Obimba-Wogu	M	Lecturer II	Academic Staff
19	Engr. Benjamin Ifeanyichukwu Ugorji	M	Graduate Assistant	Academic Staff
20	Engr. Emmanuel Chukwudi Ekeoma	M	Lecturer II	Academic Staff
21	Engr. Ibe Kizito Chidozie	M	Lecturer II	Academic Staff
22	Engr. Nwa-David David	M	Lecturer II	Academic Staff
23	Engr. Nwaobia Light Ihenna	M	Graduate Assistant	Academic Staff

7.2 List of Non-Academic Staff

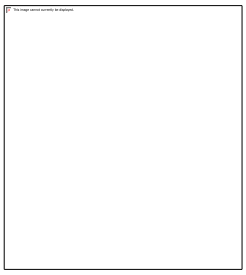
S/N	STAFF NAME	SEX	DESIGNATION	NON-TEACHING STAFF
1.	Mr. Peter Anyalewachi Ndubuwa	M	Senior Assistant Registrar	Non-Teaching Staff
2	Mrs. Elizabeth Elewechi Anorue	F	Principal Confidential Secretary	Non-Teaching Staff
3	Mrs. Onyinyechi Maryann Nneji	F	Higher Executive Officer	Non-Teaching Staff
4	Mrs. Augustina Olanma Stanley-Njoku	F	Administrative Assistant	Non-Teaching Staff
5.	Mr. Duru Michael	M	Administrative Officer	Non-Teaching Staff

7.2.1 List of Technologists

S/N	STAFF NAME	SEX	DESIGNATION	NON-TEACHING STAFF
1.	Eboh Solomon	M	Chief Technologist	Non-Teaching Staff
2.	Okpara C. John	M	Principal Technologist II	Non-Teaching Staff
3.	Cecilia Chinyere Ejike	F	Principal Technologist	Non-Teaching Staff
4.	Ekedo Churchill Chinonso	M	Senior Engr.	Non-Teaching Staff
5.	Uko Egwuonwu Ekwutosi Anthonia	F	Principal Technologist	Non-Teaching Staff
6.	Oti Victor Ejike	M	Senior Technical Officer	Non-Teaching Staff
7.	Ogbonnaya Charles	M	Principal Technologist II	Non-Teaching Staff
8.	Innocent Ije	M	Principal Engr.	Non-Teaching Staff
9.	Eze David Yahnonso	M	Principal Technologist	Non-Teaching Staff
10.	Joseph Ogechi Ihuoma	M	Senior Lab. Assistant	Non-Teaching Staff
11.	Kelechi Ikechukwu Eleazu	M	Laboratory Supervisor	Non-Teaching Staff

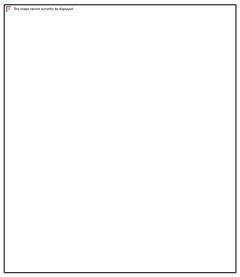
7.3 STAFF PROFILE

ENGR. DR. KENNEDY C. ONYELOWE



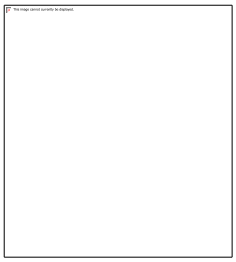
Dr. Kennedy C. Onyelowe is an Associate Professor of Civil Engineering. He holds a Bachelor of Engineering degree from the Federal University of Technology, Owerri, Master of Engineering and Doctor of Philosophy degrees in Geotechniques from the University of Nigeria, Nsukka. In addition, he obtained his second Doctoral degree in structures at the University of the Peloponnese, Greece. He has 16 years of teaching and research experience. His research interests are in geotechnical engineering, sustainable construction materials, concrete materials, and artificial intelligence (machine learning). He teaches and supervises the undergraduate and postgraduate programmes of the Department of Civil Engineering. Dr. Onyelowe has over 200 published journal and conference articles to his credit and has been named as the best researcher in MOUAU for three consecutive years by SciVal (Scopus) ranking and listed in the top 2% global scientists in 2022/2023. He was a former Deputy Dean of the College of Engineering and Engineering Technology, Michael Okpara University of Agriculture Umudike, Nigeria (MOUAU) and currently the Acting Head of Civil Engineering Department MOUAU.

ENGR. DR. B. U. NGENE



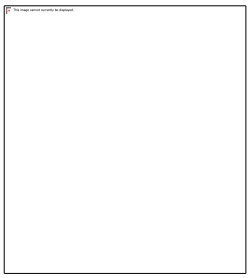
Engr. Dr. B. U. Ngene is an Associate Professor of Civil Engineering and holds a doctorate (Ph.D) degree in Water Resources and Environmental Engineering from the Federal University of Technology, Owerri is married with Children. Had early education at primary level (1970-1975) and secondary education (1976-1981) and his Tertiary/ University Education at Bachelor (Anambra State University of Technology, Enugu 1983-1988), Master's of Engineering and Doctor of Philosophy (Federal University of Technology, Owerri 1996-2010) and a second Master's of Science in Structural Engineering from (University of Surrey, UK 2011-2012).An Engineer and Manager of men with wide Industry experience such as Pupil Engineer (NNPC Warri 1988-1989), Site Engineer (Fougerolle JV Fougerolle Nig. 1989-1994), Sales/ Technical Engineer (Eternit Ltd, Sapele 1994-2004), Sales/Technical Manager (2004-2011) Senior Lecturer(Gregory University Uturu 2013-2015) and Senior Lecturer (Covenant University 2015-Till Date).A COREN registered Engineer (R.7068) and member of Nigerian Society of Engineers (06947), Dr. Ngene is actively involved in teaching, research and community service at Michael Okpara University of Agriculture, Umudike and the Covenant University, Ota.

ENGR. DR. U. N. OKONKWO



Dr. Ugochukwu Nnatuanya Okonkwo received B.Eng (Civil) from Federal University of Technology Owerri, M.Eng (Geotechnical Engineering) from Bayero University Kano and Ph.D (Geotechnical Engineering) from University of Nigeria Nsukka. He is currently an Associate Professor in the Department of Civil Engineering Michael Okpara University of Agriculture Umudike as well as a consultant to Civil and Construction Engineering firms. He is also a registered Engineer by Council for Regulation of Engineering in Nigeria (COREN) and a member of American Society of Civil Engineers (ASCE). Engr. Dr. U. N. Okonkwo has been teaching courses related to Civil Engineering Materials, Soil Mechanics and Structural Foundation Engineering up to Postgraduate level for about sixteen years now. His area of research interest includes geo-environmental, highway engineering, modeling, optimization, erosion control, slope stability and geotechnical engineering. He has to his credit many publications and also a reviewer as well as a member of editorial board in some reputable journals.

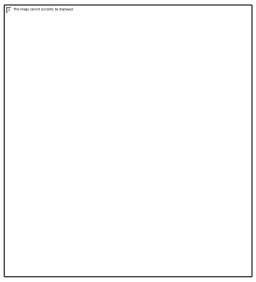
ENGR. DR. FESTUS CHUKWUDI ONYEKA



Engr. Dr. Festus Chukwudi Onyeka has done his bachelor's degree (B.Eng) in Civil Engineering from Anambra State University, Uli, Nigeria in 2006. He has done his master's degree (M.Eng) and doctorate degree (Ph.D) in Structural Engineering from University of Nigeria Nsukka in 2010 and 2020 respectively. His research area includes; Structural Engineering Mechanics, Plates and Shell theory and Theory of Elasticity, Variation Calculus and Stability of structures. He is a Senior Lecturer in

the department of Civil Engineering, Michael Okpara University of Agriculture, Umudike in Abia State, Nigeria. He is a renowned researcher in the area of Structural Engineering Mechanics and has about 74 publications which includes peer reviewed journals and conferences both locally and internationally with awards in some research breakthrough. He is a member of professional bodies which includes; corporate member of Nigeria Society of Engineers (NSE), corporate member of Nigeria Institute of Professional Engineers and Scientists, and member of Nigeria Institute of Civil Engineers (NICE), a registered engineer in Council for Regulation of Engineering in Nigeria (COREN).

ENGR. E. E. OHAZURIKE

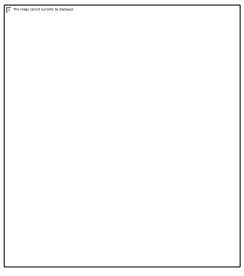


Engr. Ohazurike Emeka Evaristus is an academic staff in the Department of Civil Engineering whose Specialty includes and not limited to Construction Management, Water Resources Engineering, and Project management. He holds a B. Eng. (Civil Engineering), M. Eng. (Construction Management), and M. Eng. (Water Resources Engineering) and is currently pursuing a doctoral degree in Water Resources Engineering from the Federal University of Technology, Owerri (FUTO). He is a COREN registered Civil Engineer and a member of various professional bodies, including The Nigerian Society of Engineers (NSE), the Nigerian Institute of Professional Engineers and Scientist (MNIPES), Nigerian Institute of Water Engineers(MNIWE). He is also a certified Project manager with the Project Management Professional (PMPr) from a Pennsylvania-based based institute-Project, Management International (PMI). He has authored many research publications in both local and international Journals.

ENGR. J. OBIMBA-WOGU

Engr. Jesuborn Obimba-Wogu is an Academic staff in the Department of Civil Engineering whose specialty includes and not limited to Geotechnical Engineering, Construction and Risk Management, Architecture, and general Civil Engineering. He holds a B. Eng. (Civil Engineering) And M. Eng. (In-View) (Geotechnical Engineering) from Michael Okpara University of Agriculture. He is a COREN registered Civil Engineer, a member of the Nigerian Society of Engineers (NSE) and the International Association of Engineers (IAENG), and a scholar in the Forum for Agricultural Research for Africa (FARA), FAUBAI, ARIFA, Brazil. He has authored and co-authored several research publications in both local and international journals.

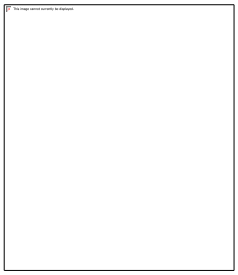
ENGR. U. I. IRO



Engr. Uzoma Ibe Iro, is a Lecturer of Civil Engineering. He holds a Bachelor of Engineering and Master of Engineering degrees from Michael Okpara University of Agriculture, Umudike. He has 9 years of teaching and research experience. His research interests are in sustainable construction materials, concrete materials, and Mechanics of Structures. Engr. Iro teaches and supervises the undergraduate programme of the

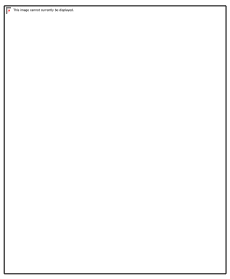
Department of Civil Engineering. He has over 10 published journal and conference articles to his credit.

NWOBIA LIGHT IHENNA



Nwobia Light ihenna is an academic staff at the Department of Civil Engineering, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria. He holds a First Class Honours degree in Civil Engineering from the same institution where he lectures, having won various awards and commendations in leadership and academic performances. Currently, he is pursuing his Master's Programme in Environmental Engineering at Technical University of Munich, Germany. He has contributed in roughly 20 peer-reviewed published scholarly works within the field of water and geo-environmental engineering utilizing soft computing techniques, and with some of them undergoing peer review processes. He was ranked among top researchers with quality scholarly inputs in the institution as a whole by the Scival (Scopus) ranking system. He has also employed his rich wealth of engineering knowledge and skills across various engineering projects including flood/erosion control works, dam construction and rehabilitation, road, bridges and building construction, among others. Being a renowned researcher, his current research interest is in the area of sustainable use of waste materials to optimize water and soil, employing data-driven approaches to understand the complexity of the Water-Energy-Waste-Food Nexus, use of machine learning approaches to predict and optimize water and geotechnical systems. His research works can be seen in Research gate and other research repositories. His dedication in research and passion for impacting knowledge is second to none. He is a great collaborator, mentor, and motivator, with excellent mastery of communication, time management, resilience, interpersonal and leadership potentials.

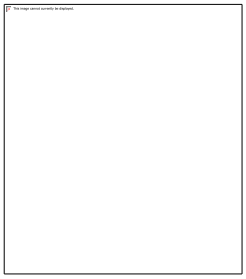
ENGR. NWA-DAVIDE, CHIDOBERE DAVID



Engr. Nwa-David, Chidobere David, is an academic staff at the department of Civil Engineering, Michael Okpara University of Agriculture, Umudike, Abia State. He holds First Class Honour (B. Eng, Civil Engineering), from Michael Okpara University of Agriculture, Umudike, Abia State. He is currently pursuing his master's degree (M. Eng. Structural Engineering) at Department of Civil Engineering, Federal University of Technology, Owerri, Imo State. He has previously worked as a site engineer and as a project manager for several construction companies. He is a renowned researcher and his research interest is in the field of elasticity theories of plates, concrete materials, optimization of concrete design, variational calculus, sustainable structural systems and studies that involves artificial intelligence networks. He has over twenty-five scholarly articles published in local and international journals in this field of interest. He can be assessed on ResearchGate and Goggle Scholar websites. His book on civil engineering materials is currently under review for publication. He is a corporate member of Nigeria Society of Engineers (NSE)) and a registered civil engineer in Council for regulation of Engineering in Nigeria (COREN). His exceptional passion for impacting knowledge reflects in his dedication

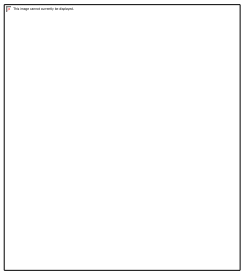
and consistency. He is a resourceful leader with excellent communication skills and capacity to handle several assignments simultaneously, demonstrating an outstanding degree of resilience and time management.

ENGR. DR. HYGINUS OBINNA OZIOKO



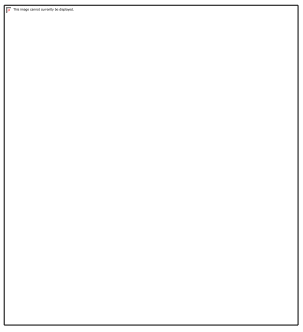
Engr. Dr. Hyginus Obinna Ozioko is a Lecturer in the department of Civil Engineering Michael Okpara University of Agriculture Umudike. He obtained his Bachelor's degree (B.Eng), Master's degree (M.Eng) and Doctorate degree (Ph.D) from the prestigious Federal University of Technology Owerri, Imo State, Nigeria. His research interest includes Structural Mechanics, Sustainable Construction Materials, Structural concrete, Computational Soil Mechanics, Soft Computing/Artificial Intelligence; Machine learning, Modelling and Optimization, Nano-materials technology, Environmental wastes, Recycled aggregates, Highway structures, Structural Geotechnics, Soil Erosion, Solid Waste and Geo-materials. He has worked with three multinational construction companies before joining academics. In addition, he is presently a part-time consultant in structural engineering projects. Apart from research, teaching and construction engineering, he also enjoys physical exercises like playing football, long tennis and basketball.

ENGR. HENRY KENE UGWUANYI



Engr Henry Kene Ugwuanyi is a Lecturer 1 in the Department of Civil Engineering MOUAU. He holds bachelor's and Master's (Highway) degrees in Civil Engineering from the University of Nigeria Nsukka. He has about 11years of teaching and research experience. His research interest is in Transportation and Traffic engineering and mathematical modelling of pavement and traffic structures. He also teaches and supervises undergraduate projects, including teaching some postgraduate courses. He has about 18 publications, conferences and journal articles to his credit.

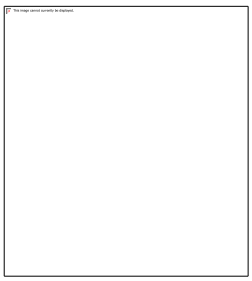
ENGR. DR. OBIEKWE A. UBACHUKWU, B.Eng (Awka),M.Eng, Ph.D (Nig), MNSE, COREN Regd., K SC



Engr. Dr. O. A. Ubachukwu holds a Bachelor of Engineering, B.Eng degree in Civil Engineering, from NnamdiAzikiwe University (NAU), Awka; Master of Engineering, M.Eng and Doctor of Philosophy, Ph.D degrees in Civil Engineering, with specialization in Structural Engineering from University of Nigeria Nsukka (UNN). He is a registered member of the Council for the Regulation of Engineering in Nigeria (COREN), a Corporate Member of the Nigerian Society of Engineers (NSE) and a Consultant in Civil Engineering research and practice. He has been involved in the design and construction of some roads, buildings, culverts and other civil engineering works. He is a team player.**C**urrently, he is a Senior Lecturer in the Department of Civil Engineering at Michael Okpara University of Agriculture, Umudike, Abia State-Nigeria, where he researches and teaches courses at both undergraduate and postgraduate levels. He has published several scholarly research papers in

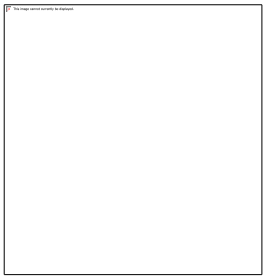
reputable journals.Heis voracious in community service, particularly for the church of God and humanity. Presently, he is the Chairman Diocesan Project Monitoring Committee of the Anglican Diocese of Ikwuano, Abia State. He is a Knight of St. Christopher (KSC) in the Anglican Communion.

ENGR. K. C. IBE



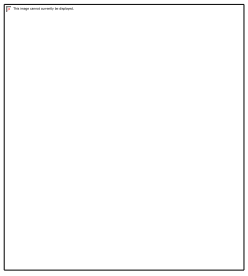
Ibe Kizito Chidozieis an academic staff in the Department of Civil Engineering at Michael Okpara University of Agriculture, Umudike, Abia State. He holds a Higher National Diploma (Distinction) in Civil Engineering from Federal Polytechnic Nekede, Owerri, Imo State, Bachelor of Engineering degree (First Class Honours) in Civil Engineering from Michael Okpara University of Agriculture, Umudike, Abia State and was awarded the Best Graduating Student for that year. He is currently a Master of Engineering student (Structural Engineering) in the Department of Civil Engineering, Federal University of Technology, Owerri, Imo State. His research focuses on the development of sustainable construction materials using recycled, waste or natural materials and environmentally friendly processes. He has a strong interest in finding innovative solutions to the challenges of sustainable development and has published several papers on this topic. He is an active corporate member of Nigerian Institution of Civil Engineers (NICE), Nigerian Society of Engineers (NSE) and a registered Engineer with the Council for the Regulation of Engineering in Nigeria (COREN). He is a team player who is committed in creating positive changes in the built environment through research and construction activities.

ENGR. INNOCENT IJE



Engr Innocent Ije is a graduate of the Department of Civil Engineering, Federal University of Technology Owerri, where he obtained a B.Eng in Civil Engineering. He holds a Master of Engineering from the Department of Civil Engineering, Michael Okpara University of Agriculture Umudike. He is a registered Engineer with the Council for the Regulation of Engineering in Nigeria. Engr Innocent Ije has been a consultant to several organizations and is currently a staff of Civil Engineering, Michael Okpara University of Agriculture Umudike.

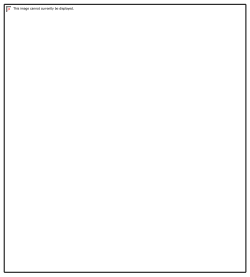
ENGR. IFEOMA M. JIDEOFOR, B.Eng (ANSU), M.Eng, (Nig), NIPES, COREN Regd.



Engr. I. M. Jideofor holds a Bachelor of Engineering, B.Eng degree in Civil Engineering from Anambra State University Uli (ANSU),; and a Master of Engineering, in Water Resources & Environmental Engineering Civil Engr from the University of Nigeria Nsukka (UNN). She is a registered member of the Council for the Regulation of Engineering in Nigeria (COREN), and a Corporate Member of the Nigerian Institution of Professional Engineers and Scientists. She is a researcher and Lecturer in the Department of Civil Engineering, Michael Okpara University of Agriculture, Umudike, Abia State-Nigeria, where she researches and teaches courses at both

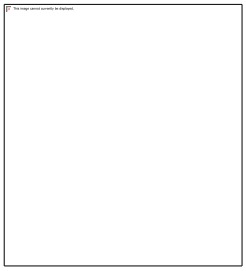
undergraduate and postgraduate levels. She has published several scholarly research papers in reputable journals and attended conferences and workshops.

ENGR. DR. E. E. ARINZE



Engr. Dr. Emmanuel E Arinze is a Senior Lecturer in the Department of Civil Engineering at Michael Okpara University of Agriculture, Umudike, and is currently a Postdoctoral Fellow in the Department of Civil Engineering and Geosciences at Newcastle University in the United Kingdom. He obtained his B.Eng in Civil Engineering from Nnamdi Azikiwe University, Awka, as well as an M.Eng and PhD in Geotechnical Engineering from the University of Nigeria, Nsukka. He formerly worked as a Project Manager at Emucon Nigerian LTD and as a Research Officer at the Nigerian Building and Road Research Institute (NBRRI) in Otta, Ogun State. He is a member of the Nigerian Society of Engineers (NSE) and the Material Science and Technology Society of Nigeria (MSN). He is also a registered Engineer with COREN. He has numerous publications in both international and local journals, as well as conference proceedings.

ENGR. SOLOMON O. EBOH



Engr. Solomon Onyemaechi Eboh has worked with a number of civil engineering companies before joining the services of Michael Okpara University of Agriculture Umudike as a senior technologist. He started his career in civil engineering technology, with a Dutch company -, 1-2-3 Sustainable Water Supply Service (S.W.S), at her New Busa Station in Borgu Local Government Area of Niger State, From 1996 - 1999, As ENGN.TECH Officer in the water and sanitation unit of the LAFIA project. Sponsored by the Federal Republic of Germany. From 2000 to 2008, worked with an indigenous Consultancy Firm, DAMTECH NIGERIA LIMITED, with Headquarters at Jos, Plateau state. During that period, he worked with her team on WAYA - DAM spillway redesign and reconstruction project at Bauchi State., and the LIKARBU - DAM (Design and Feasibility) project. Later, he joined her team at the Mambilla 2,600 MW Dam project, which involved a Geotechnical investigation of the sites. From 2008 to 2010, I worked with A-4 Associate, another consultancy firm with Headquarters in Abuja. I worked at one of her sites situated at Jalingo Taraba state capital - Supervision of the construction of the 25,000 metric tons Silos project. Due to the crisis that erupted in parts of Northern Nigeria, and in a bid to relocate to my state of Origin, I joined the services of Michael okpara University of Agriculture Umudike (MOUAU) as a senior technologist, he has now risen to the rank of Chief Technologist. His academic qualifications include M.Eng (MOUAU-2022); M.Sc (IMSU-2003);PGD management (IMSU-2000);PGD civil engineering (ATBU-2006).Membership of professional bodies: Registered Engineer - COREN.(20583).Member Nigeria Society of Engineers-(MNSE);Member Nigeria Institute of Civil Engineers-(MNICE).Member Nigeria Association of Technologists in Engineering-(NATE).Member Science Teachers Association of Nigeria -(MSTAN). He has, as at present, about eighteen (18) publications.