Michael Okpara University of Agriculture, Umudike.

COLLEGE OF ENGINEERING AND ENGINEERING TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

UNDERGRADUATE HANDBOOK

TABLE OF CONTENTS

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:

100 Level: First Semester

Course code	Course title	Credit unit
ENG 111	Introduction To Engineering	1
MTH 111	Elementary Mathematics 1	3
PHY 111	General Physics 1	2
PHY112	Elementary Physics 1	2
PHY117	General Physics Laboratory 1	1
CHM 113	General Chemistry 1	3
CHM 114	Practical Chemistry 1	1
GSS 111	Use Of English 1	1
GSS 112	Nigerian History	2
GSS 114	Elementary French 1	1
GSS 115	Basic German 1	1
GSS 116	Use Of Library	1
UGC 111	Farm Practice	1
		20

100 Level: Second Semester

Course Code	Course Title	Credit Unit
ENG 121	Computer Application and Information Technology	2
MTH 122	Elementary Mathematics II	3
MTH 123	Introduction to Vectors	2
PHY 121	General Physics II	2
PHY 122	Elementary Physics II	2
PHY 127	Physics Laboratory II	1
CHM 121	General Chemistry II	3
CHM 124	Practical Chemistry II	1
GSS 121	Use of English II	2
GSS 124	Elementary French II	1
GSS 125	Basic German II	1
GSS 126	Social Sciences	2
		22

200 Level: First Semester

Course Code	Course Title	Credit Unit
ENG 211	Thermo-Dynamics 1	3
ENG 212	Workshop Technology/Practice	2
ENG 213	Applied Electricity	3
ENG 214	Engineering Drawing 1	2
ENG 215	Applied Mechanics	3
MTH 211	Mathematical Methods 1	3
MTH 214	Linear Algebra 1	2

GSS 212	Peace & Conflict Resolution Studies	2
GSS 217	Philosophy And Logic	2
		22

200 Level: Second Semester

Course Code	Course Title	Credit Unit
ENG 221	Strength Of Materials 1	2
ENG 222	Engineering Drawing II	2
ENG 223	Computer Programming	3
ENG 224	Material Science	2
ENG 225	Fluid Mechanics I	2
ENG 226	Engineering In Society	1
MTH 221	Mathematical Methods II	3
STA 224	Statistics For Physical Science & Engineering	3
ENG 200	Student Work Experience Programme (SWEP) I	1
GNT 221	Entrepreneurial Studies	2
		21

300 Level: First Semester

Course Code	Course Title	Credit Unit
ENG 311	Engineering Economics	2
ECE 311	Element Of Architecture	3
ECE 315	Strength Of Materials II	3
ENG 313	Engineering Analysis	3
ECE 314	Water Resources & Environ. Engr. Lab I	1
ECE 317	Civil Engineering Materials	2
ECE 318	Engineering Geology	2
ECE 319	Fluid Mechanics II	2
GNT 311	Business Development & Management	2
		20

300 Level: Second Semester

Course Code	Course Title	Credit Unit
ENG 321	Theory Of Structures 1	3
ECE 323	Hydrology	2
ECE 324	Engineering Survey & Photogrammetry 1	4
ECE 326	Reinforced Concrete Design	2
ECE 327	Soil Mechanics I	3
ECE 328	Concrete Technology	2
ENG 326	Technical Writing and Presentation	1
ENG 300	Student Work Experience Programme (SWEP) II	1
		18

400 Level: First Semester

Course Code	Course Title	Credit Unit
ECE 411	Theory Of Structures II	2
ECE 413	Steel And Timber Design	2

ECE 414	Soil Mechanics II	2
ECE 416	Construction Management I	2
ECE 417	Engineering Survey and Photogrammetry II	3
ECE 418	Highway Engineering	2
ECE 419	Civil Engineering Hydraulics	2
ENG 418	Computational Methods in Engineering	3
GNT 411	Practicum	2
		20

400level: Second Semester

ENG 400	Student Industrial Work Experience Scheme (SIWES)	15 Credit

PROGRAMME FOR INDUSTRIAL ATTACHMENT

500 Level: First Semester

Course Code	Course Title	Credit Unit
ECE 500	Project	3
ECE 501	Seminar	1
ECE 511	Structural Mechanics 1	3
ECE 514	Water Resources and Environ Engr.I	2
ECE 515	Foundation Engineering I	3
ECE 518	Construction Management II	3
ECE 519	Highway/Transportation Engineering I	3

Electives (Only One Course From Below)

ECE 512	Theory Of Plates and Shells	3
ECE 513	Traffic Engineering	3
ECE 516	Water Resources & Environmental Engr. II	3
ECE 517	Geotechnical Engineering I	3
		21

500 Level: Second Semester

Course Code	Course Title	Credit Unit
ECE 500	Project	3
ECE 522	Highway/Transportation Engineering II	3
ECE 524	Public Health and Environ. Engr.I	2
ECE 525	Civil Engineering Practice	2
ECE 526	Foundation Engineering II	2
ECE 527	Design Of Structure/Studio	3

Electives (Only One Course From Below)

ECE 521	Geotechnical Engineering II	3
ECE 523	Structural Mechanics II	3
ECE 528	Modern Transformation Engineering	3
ECE 529	Public Health and Environ Engr. II	3
		21

6.1 Course Description

ENG 111: INTRODUCTION TO ENGINEERING (1 Credit)

Engineering and Technology: Man, his origin and nature; man, and his economic environment; scientific methodology; science and technology in the society and service of man. Renewable and non-renewable resources: Man, n and his energy resources. Environmental effects of chemicals, plastics, textiles, wastes and other materials. Chemical and radio-chemical hazards. Introduction to the various areas of science and technology. Engineer in society: History of Engineering and Technology; Safety in Engineering and Introduction to Risk Analysis. The Role of Engineers in nation building. Invited lecturers from professionals.

MTH 111: GENERAL MATHEMATICS I (3 Credits)

Indices, logarithms and surds. Quadratic functions, equations and inequalities. Permutations and combinations. Matrices and determinants. Application to the solution of systems of equations in almost three unknowns. Trigonometry: circular measure. Trigonometric functions of angles. Trigonometric identities, addition and factor formula. General Solution of trigonometric equations such as a $\cos\theta$ + b $\sin\theta$ - C. Coordinate Geometry: The distance between two points, the mid-point formula, the gradient of a line joining two points, and the Equation of a straight line. Parallel and perpendicular lines. Division of a line in a given ratio. Equation of a circle sine Cartesian coordinate, tangents to circle.

PHY 111: GENERAL PHYSICS I (MECHANICS AND PROPERTIES OF MATTER (2 Credits)

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

PHY 112 ELEMENTARY PHYSICS I (2 Credits)

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

PHY 117 GENERAL PHYSICS LABORATORY 1 (1 Credit)

Relevance of physics to agriculture, fundamental and derived units, dimensions, vectors; addition & subtractions of vectors, resolution of vectors, scalar & vector products. Equilibrium, the principle of moments, the center of gravity and its application in agriculture, kinematics displacement, velocity and acceleration, projectile motion, circular motion, and simple harmonic motion. Dynamics; elasticity; statics, friction, inertia, moment of inertia and torque; properties of matter, Archimedes principle; fluid pressure. Blood pressure.

CHM 113: GENERAL CHEMISTRY 1 (3 Credits)

Basic principles of matter and energy from the chemist's point of view: atomic theory and molecular structure, stoichemistry, the periodic classification of the elements, atomic structure, chemical bonding properties of gases solids, liquids and solutions, chemical equilibrium, 1Onic equilibrium, chemical thermodynamics, Electra chemistry and chemical kinetics (includes laboratory sessions).

CHM 114: PRACTICAL CHEMISTRY I (1 Credit)
Laboratory exercises are drawn from CHM 113.

GSS 111: USE OF ENGLISH I (1 Credit)
Listening comprehension: note-taking during lectures, note-taking from audio-visual equipment, concentration signals and cues as aids to listening comprehension. Phonetics, The use of the Library and Basic Research Methods: Types of Libraries, forms of Library services, cataloguing and book classification schemes, the process of data collection/analysis, research writing, process and technique, documentation, references, notes and bibliography, abbreviations in research writing, the finished research report. Reading comprehension: the outline note, summary writing, genre and techniques of reading comprehension: scanning, skimming intensive/extensive reading, word/text attack skills, SQ3R techniques, varieties of English and Levels of Usage, vocabulary development: word choice and usage denotation and connotation. Term paper writing and submission.

GSS 112: NIGERIAN HISTORY (2 Credits)
The concept of culture, pre-colonial cultures and languages of Nigeria. Principles of kinship. Descent and marriage in Nigerian cultures. Nigerian economic institutions, Nigerian political institutions. Education and development in Nigeria. Religion in Nigerian culture. Culture, environment and health practices in Nigeria.

GSS 114: ELEMENTARY FRENCH 1 (1 Credit)

Introduction au pays La FRANCE et a 'a language francaise. Development de la langue a travcrs le monde. La Francophonie et les habitants des pays. Pourquoi le francais au Nigeria. La contribution de la France dans le development de 1'Apriculture. de la Science et de a Technologie. Les salutations quotidiennes et usuelles. Presentation de soi etd'auuui. hom, profession, agresse, et nationalite etc. Lesprofessions dans le secteur agricole. Le personnel de 1'universite. Identification des gens et des objets communs. Les nombres car dinaux et ordinanx. S'oriente trouver son chemin dans le campus. Interrogation cl negation a base des verbes les plus usages chaque jour.

GSS II5: BASIC GERMAN I (1 Credit)
Pronunciation of the alphabet (A, B, C, D, E, cte) vowels Diphthongs (ai, ci, ou, cu, oi, ui) and consonants (b, c, d,). Differentiation of verbs int: Starke, scbwachc, and Hilfsverb. Conjugation of yeru
prescns, Imperfckl, Plusquam pcrfckt, Futur I, Futur II. D Dcklinatiorttof nouns use of definite and indefinite articles -- der. dic, das, cin, cinc, and their declinations. The we of belimmte and umbestimte Numeralc, as well'as Adjective and ite comparison. Use of capital letters and their importance. Alltag usages-days of the week, season of the year, timing, the months. The use of Negation -nicht. Interrogation-weiche, was, warum, wer; Hilfsverbs- sein, haben. ctc.

Pronouns (Wir, lch, du, sic, cr, cs, Ihr, Sic).

UGC III. FARM PRACTICE (1 Credit)

ENG 121 COMPUTER APPLICATIONS AND INFORMATION TECHNOLOGY (2 Credits)
Computer Application Overview: Data Processing Application and Computations involving Microsoft Excel (Spreadsheets), PowerPoint, etc. Introduction to Computer Simulation software: Use of Computer Software for solving mathematical problems. Management Information Systems and Networks: Information Technology, Network and Securities etc.

MTH 122: ELEMENTARY MATHEMATICS II (3 Credits)
Functions: concept and notation. Polynomial and rational functions Trigonometric, exponential, and logarithmic functions. Limit and the idea continuity. The derivative as the limit of the rate of change and the differentiation of Algebraic, trigonometric, exponential, and logarithmic functions. Techniques of differentiation. Application to curve sketching, maxima and minima, etc. Integration as inverse of differentiation. Definite and Methods of Integration (substitution, partial fractions, parts).Application to geometry and mechanics.

MTH 123: INTRODUCTION TO VECTORS (2 Credits)
Equations of straight lines, circles, ellipses, parabolas, and hyperbola. Tangents and normal. Vectors, laws of vector algebra. Representation of vectors in 1-3 dimensions. Components and direction cosines. Addition of vectors and multiplication of a vector by a scalar. Scalar and vector products of two vectors, triple products, vector equation of a straight line and plane.

PHY 121: GENERAL PHYSICS II (2 Credits)
Waves; Dynamics of waves. The wave equation, characteristics of waves, stationary waves. Light waves and their characteristics. Imaging, sound wave. Doppler effects. The converging lens. Refraction at plane surfaces. Electricity; electrostatic force. Coulomb's law, electric field and electric potential. Ohm's law, Alternating current. Magnetism: magnetic effects of currents. Permanent magnetism, para.Dia and Ferro-magnetism. Faraday's laws of induction. The potentiometer and the wheat stone bridge. Concept of heat. Temperature and thermometers.

PHY122: ELEMENTARY PHYSICS II (2 Credits)
Electrostatics, conductors and currents; dielectrics, magnetic field and induction; Maxwell's equations; Electromagnetic oscillations and waves; applications.

PHY 127: PHYSICS LABORATORY II (1 Credit)
This introductory course emphasizes quantitative measurements, the treatment of measurement errors and graphical analysis. A variety of experiment techniques will be employed. The experiments include studies of meters, electrical and mechanical meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems light heat velocity.

CHM 121: GENERAL CHEMISTRY II (3 Credits)
Application of the principles of chemical and physical l change lo the study of the behaviour of matter and the interaction between matter. Course content includes the chemistry of representative elements and their common compounds with emphasis on gradation of their properties - brief chemistry of the first series of transition elements, general principles metals; introductory nuclear chemistry (includes Lab Sessions),

CHM 124: PRACTICAL CHEMISTRY II (I Credit)
The theory and practice of simple volumetric and qualitative analyses simple organic preparations, reactions of functional groups and physical determinations.

GSS 121: USE OF ENGLISH II (BASIC GRAMMAR &VARIETIES OF WRITING (2 Credits)
Each student is required to study a recommended novel. Basic Grammar: Sentence elements, sentence types and varieties, punctuation and capitalization, abbreviation in sentence construction, homonyms, synonyms, antonyms and acronyms, error identification and correction. Writing Skills and varieties of writing: the paragraph -devices of coherence/logical connectors, types of writing - narration, description, exposition, and argumentation.

GSS 124: ELEMENTARY FRENCH II (1 Credit)
Les jours de la semaine, les mois de l'annee, la date. Description physiques e psychologiques de soiet des autrespersonnesQuelleheureest-i1? Descripaou de la vie etdcs activities quotitienness; interrogation et negation. L'alphabetfrancsaiset 1' orthographe, introduction a la dictee. Les adjectives possessifs, Le corps humain.Al'hopital. Enville: a la poste, au marche, a lagare, a la biblionthequcetc, Les autresmoyens de transport. La familtec, Icsvclcmentset les couleurs.

GSS 125: BASIC GERMAN II (1 CREDIT)
Saiziehre (Sentence Construction): definition of sentences, art and form of German sentences, Das Saizghid. Use of Suffixes and Prefix; U Use of big and small letters in sentences; Conjugation of verbs.

GSS 126: SOCIAL SCIENCE (2CREDITS)

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

SECOND YEAR

ENG 211: THERMODYNAMICS I (3 CREDITS)

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

ENG212 WORKSHOP TECHNOLOGY/PRACTICE (2 CREDITS)

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

ENG213: BASIC ELECTRICAL ENGINEERING (3 Credits)

SI System of unit, E.S and FM Fields: Electric field intensity, potential and potential difference, magnetic field intensity, flux and flux density, Magnetic circuits, inductors. DC circuit analysis: Kirchoff's Law, Mesh and Nodal Equations, superposition Theorem. Thevenin's theorem, Norton's Theorem, Maximum power transfer, transients (RL and RC) circuits.

AC Circuit analysis: Alternating current, voltage, Frequency, Phase angle, Maximum RMS and average values of waveforms. Inductive and capacitive reactance. Power in AC circuits, use of complex algebra in the solution of AS circuits, Resonance. Three phase AC system: Three phase balanced system, Delta/star connections, line and phase voltages and currents.

ENG214: ENGINEERING DRAWING I (2 Credits)

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

ENG215: ENGINEERING MECANICS (3 Credits)

Statics: laws of statics: System of forces and their properties; friction, free body diagrams, equilibrium condition, vector equations and vector diagrams, simple problems. Particle dynamics: translational motion and rotational motion, general planar motion, kinematics of plane motion. Laws of motion, Newton's law, kinetics of particles momentum and energy methods. Kinetics of rigid bodes: two dimensional motions of rigid bodies, energy and momentum. Mass and moment of inertia. Simple harmonic motions. Concepts and types of mechanisms. Static and dynamics forced analysis.

MTH 211: MATHEMATICAL METHODS I (3 CREDITS)

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

GSS 212: PEACE AND CONFLICT RESOLUTION STUDIES (2 CREDITS)

This course focuses on basic concepts in peace studies and conflict resolution, peace as a vehicle of unity and development, conflict issues, types of conflicts e.g., ethnic/religious/political/economic conflicts, types of conflicts and violence in Africa, indigene/settler phenomenon, peace building, management of conflict and security. Elements of peace studies and conflict resolution. Dispute resolution (ADR), Dialogue/Arbitration in conflict resolution, roles of international organization in conflict resolution, e.g., Economic Community of West African States (ECOWAS), African Union, United Nations, communal/indigenous conflicts, individual conflict, terrorism

MTH 214: LINEAR ALGEBRA I (2 CREDITS)

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

GSS 217: PHILOSOPHY AND LOGIC (2 CREDITS)

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

ENG 221: STRENGTH OF MATERIALS I (2 CREDITS)

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

ENG 222: ENGINEERING DRAWING II (2 CREDITS)

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

ENG 223: COMPUTER PROGRAMMING (3 CREDITS)

Computer, computing and engineering, algorithms flow chart and pseudo code. Computer languages, programming in FORTRAN, Matlab, C+t or latest versions. Debugging techniques. Computer code security. Laboratory: hands-on experience on computers through the use of 'Compilers to run programs' and to solve simple analysis problems in fluid, thermodynamics, heat transfer and electrical systems.

ENG 224: MATERIALS SCIENCE (2 CREDITS)

Atomic and Molecular Structures, Crystals. Metallic States. Defects in Crystals, Conductors, Semi-conductors and Insulators. Alloy theory- application to industrial alloys steel in particular. Engineering Properties - their control, hot and cold working, heat treatment, etc. Principles of mechanical testing, impact test, tensile test, hardness tests, fatigue tests, creep test and non-destructive tests. Fracture. Corrosion and corrosion control. Equilibrium and rate

reaction. Non-metallic materials - glass, rubber, concrete, plastics, wood and ceramic materials. Electrical properties. Magnetic materials: properties and characteristics. Domain theory. magnetostic, anisotropy, losses, permanent magnets, transformers, cores. Electric materials: Liquid, solid and organic dielectrics polymer properties/characteristics, inorganic materials, piezoelectric and Ferro electric materials, composite structures, conductors, superconductors and insulators. Reactions and phase equilibra: reaction rate, rate laws. Mechanisms and theories of elementary processes; photochemical reactions. Basic Electrochemistry.

ENG 225: FLUID MECHANICS (2CREDITS)

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

ENG 226: ENGINEER IN SOCIETY (1 credit)

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

ENG 227: MECHANICS OF MACHINES I (2CREDITS)

Concepts and types of mechanisms: Kinematics of mechanisms, kinematics analysis, cam, complete static and dynamic forces and analysis. Flexible shaft couplings, virtual work, energy and speed fluctuations in machines. The flywheel and mechanical governors. Acceleration of geared systems, equilibrium of machines, brakes and dynamometer mechanisms. Spiral gearing and theory of involutes gearing simple, compound and epicyclical gear trains. Dynamics of rotating and reciprocating machines, static and dynamic balancing of machines. Balancing of rotating masses, multi-cylinder engines and governors. Gyroscope.

MTH 221: MATHEMATICAL METHODS II (3CREDITS)

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

GNT 221: ENTREPRENEURIAL STUDIES (2 CREDITS)

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

STA 224: STATISTICS FOR PHYSICAL SCIENCE & ENGINEERING (3 CREDITS)

Distributions: Binomial. Poisson, Geometric and Hyper-geometric. Continuous probability distributions: Normal, chi-square (x), and F.

ENG 200: STUDENTS WORK EXPERIENCE PROGRAMME (1CREDIT)

THIRD YEAR

ENG 311: ENGINEERING ECONOMICS (2CREDITS)

Basic concepts. Factors of production. Supply and demand. Price elasticity analysis. Household behavior theories. Business organization. Production, the market, income employment - classical non-classical and Keynesian approaches. Money, Expenditure, Taxation, Budget. International trade. Cost Analysis. Fixed and variable cost, Capital cost. Cost Recovery factor. Depreciation and break-even analysis.

ENG 313 ENGINEERING ANALYSIS (3 Credits)

Complex derivatives and analytic functions, Bilinear transformation, conformal mapping, contour integration, Cauchy's integral theory, residue theorem, applications and Riemann's surfaces. Special functions, Bessel's function, Fourier series and Legendre functions. Simultaneous differential equations with constant coefficients: Laplace transforms methods. Linear second-order differential equations with constant and variable coefficients classification of second-order partial differential equations: - Laplace, wave and diffusion equations, initials and boundary value problems, separation of variables, similarity solutions. Solutions of equations by iteration. Newton-Raphson Method: Errors Numerical differentiation and integration, Simpson's rule. Introduction to interpolation and curve fittings. Statistical Analysis; Regression and Correlation: large sampling theory, Test -Hypothesis and Quality Control, Introduction to system modeling.

ECE 311: ELEMENTS OFARCHITECTURE (3 Credits)

Introduction Dimensional awareness, Graphic communication, and Relation to environments. Elementary Designs. Computer-Aided Design. Fee hand drawing- form in terms of shade, light and shadow. Orthographic: diametric, perspective projection Application. Common curves.

ECE 314: WATER RESOURCES AND ENVIRONMENT ENGINEERING LABORATORY (1 Credit)

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.

ECE 315: STRENGTH OF MATERIALS II (3 Credits)

Advanced topics in bending moment and shear force in beams. Theory of bending of beams. Deflection of beams. Unsymmetrical bending and shear centre and applications. Three pinned Arches and frames. Composite and built-up beams. Strain energy and principles of work. Castigliano's theorems. Biaxial and triaxial state of stress. Transformation of stresses. Mohr circle. Close-coiled helical springs. Other types of springs. Strength theories stress concentration, creep-fatigue and fracture.

ECE 317: CIVIL ENGINEERING MATERIALS (Credits)

Introduction to Concrete Technology: Types of cement, aggregate: properties, concrete mix, Design, properties and their determination Steel Technology: production, fabrication and properties: corrosion and its prevention. Test on steel and quality control. Non-ferrous metals: Aluminum Copper, Lead, Tin and their uses. Timber: types of wood, structure, physical properties, defects, stress grading, preservation and fire protection: types and methods timber products and uses in construction. Nigerian Timber Bituminous materials binders and their properties. Other materials: rubber plastics, glass, lime, bricks, asphalt, tars, building stones, ceramic products, paints, varnishes, etc. Applications to building and civil engineering work İnsitu tests: Soils - Moisture content, atterberg Limits (LL, PL, SL); Particle analysis/mechanical sieving and pipette and hydrometer methods): Strength measurement (unconfined compression, shear box and triaxial tests; One-dimensional consolidation test; Permeability measurement: Compaction (Dry density moisture content relationship); CBR measurement; Chemical Tests (organic matter content, pH value);

ECE 318: ENGINEERING GEOLOGY (2 Credits)

Geology and its relation to Civil Engineering. Important mineral and major rock types, geologic time scale, elements of physical geology and earth history, Physical and engineering properties of rocks, principles mechanics of rock deformation, introduction to geology of Nigeria construction materials, essentials of hydrogeology and engineering geology. Outlines of mineral resources of Nigeria. Engineering Application – Water supply, site investigation, dams, dykes, etc.

ECE 319: FLUID MECHANICS II (2 Credits)

Flow measurements, Errors in measurement. Flow meters. Laminar and turbulent flows, velocity distribution, laminar flow between parallel plates and through circular tubes. Boundary layers, lift and drag. Stream function. Velocity potential and application flow nets, curved flow: equation for radial pressure variation, radial flow, free vortex flow, forced vertex flow. Dimensional analysis: Philosophy (introduction, physical dimensions. dimensional homogeneity), (methods of dimensional homogeneity dimensions, dimensional homogeneity). (Methods of dimensional homogeneity), methods of dimensional analysis "similitude. Applications. Steady and unsteady flow in closed conducts, including pipeline analysis: pipe network, branching pipes. Hardy cross method of pipe network analysis, hydraulic model.

ECE 321: THEORY OF STRUCTURES I (3 Credits)

Analysis of determinate structures. Beams, trusses, structure theorems, Graphical methods: Application to simple determinate trusses, Williot Mohr- diagrams. Deflection of statically determinate structures; Unit load method. Moment-area method, conjugate beam method. Advanced topics in strain energy method. Influence lines and various methods. Introduction to statically indeterminate structures.

Position and responsibilities of the contractor and engineer. Construction machinery and equipment. Factors affecting plant selection: foundation problems: pavement construction, concrete construction, steel construction; pipe laying, setting out, tor work, use of modem equipment in finishing works. Modem techniques in construction works, influence of technology in the method of designing. Application/case study - dams, foundations, bridges, highways, industrial buildings, sewage work. Professional Ethics and Conduct Law - definition specifications, business law to engineering, Patent and Inventions.

ECE 323: HYDROLOGY (2 Credits)

Introduction: 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 the hydrological cycle, infiltration as factor of runoff and as recharge of groundwater, comparison of methods of estimating infiltration. Drainage basins and hydrographs monthly and annual run-off 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.

ECE 324: ENGINEERING SURVEY AND PHOTOGRAMMETRY I (4credits)

Introduction to engineering survey-, and principles. Chain surveying principles and methods, Field uses and adjustment of Theodolites and Level Measurement of errors and corrections. Applications, field procedure compass surveying, methods, plotting contours, profiles and cross sections, traversing: principles, types close and open, bearing and coordinates applications. Methods rise and fall, the height of collimation: errors and their adjustments. Applications setting out, contouring, sectoring (longitudinal and cross sections). Tachometry: principles, tachometry, types: stadia tachometry, substance weighting. Electromagnetic Measurement (EDM principles, instrument characteristics, - EDM corrections. Applications Introduction to Photogrammetry, principles, types: terrestrial and aerial photogrammetry.

ECE 326: REINFORCED CONCRETE DESIGN (2 Credits)

Fundamentals of design process, materials selection. building regulation and relevant codes of practice, design philosophy; elastic and limit state designs in concrete, principles or modular ratio and load factor Analysis of

structure and analysis of sections (for bending moment, shear stress, bending stress and torsion serviceability and stability requirements). Design of structural elements in reinforced concrete eg. Simple supported and continuous beams, slabs and short column. Design and detailing of reinforced concrete beams, slab, and short column. (3 Credits)

ECE 327: SOIL MECHANICS I

Introduction: Origin and formation of soils. Soil in water relationship, soil classification. Atterberg limits particle size distribution. The Boussinesq problem stresses under uniformly leaded rectangular areas. Settlement of elastic soil masses. Permeability and capillarity of soils. Effective stress law. Seepage forces and quicksand phenomenon. Compressibility and consolidation of soil. The time rate of settlement. total settlement computations, earth slopes, critical height of banks, and effect of pore pressures.

ECE 328: CONCRETE TECHNOLOGY

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 (NDT)

ENG 326: TECHNICAL WRITING AND PRESENTATION (1 Credit):

Oral communication: Public speaking skills with effective use of visual aids and statistical and technical information principles of effective communication in interpersonal and mass communication processes. Written communication principles of technical writing 1Shrs (Teaching and Demonstrations), 30hrs (Practical).

FOURTH YEAR

ECE 411: THEORY OF STRUCTURES II (2Credits)

Indeterminate structural analysis: slop-deflection and moment distributions methods. Energy and virtual work methods. Influence coefficient method. 2 theorem of Castigliano, least work therein. Influences lines. Elastic Instability. Simple plastic theory of bending collapse loads. Stress Grading of timber, visual mechanical and electronic stress grading of timber.

ECE 413: STEEL AND TIMBER DESIGN (2Credits)

Fundamentals of the design process: m materials selection, codes of practice. Design philosophy: elastic design, limit stale design and others. Design of connections: riveted connections, boiled connections and welded connections in torsion and bending. Design of basic structural cement: beams, columns, column bases, and torsion members. 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 in design and detailing of connections, basic structural elements in steel and timber

ECE 414: SOIL MECHANICS II (2Credit)
Laboratory soil tests include classification and index tests, permeability, specific gravity tests, direct shear, triaxial, and consolidation tests. Insitu density tests compaction and C.B.R. tests, identification of rock and rock materials physical and engineering properties or rocks. Terzaghi Bearing capacity.

ECE 416: CONSTRUCTION MANAGEMENT: (2 Credits)

Network analysis: arrow diagrams, bar chads, critical path methods. programme evaluation and review techniques, inventory control: resource levelling models. Applications: cost analysis, activity crashing scheduling. job loading sequencing, production planning and control, inspection and testing methods, and quality control. The management of environment: Formation of company, sources and finance, money and credit. Insurance; National policies, GNP growth rate and prediction. Company organizational overview of the construction industry. Motivation theories and incentive schemes. Bonus scheme and their calculations. The setting of target rates. Cost systems and control. Credits Allocation of costs. Project costs accounting and estimation. Preliminary and final estimates. Measurement of work quantities. Systematic plant selection, setting of higher rates of the plant. Time value of money, cost of money and interest rates. Return on investments. Arbitration, job planning and decision making, programme charts CPM and PERI, production control Grant! Chart.

ECE 417: ENGINEERING SURVEYS & PHOTOGRAMMETRY (3 credit)
Use of levels and theodolite, methods of contouring, contour interpolation and use of contour plans and maps. Use of Abney levels. Field works Su and design of routes slotting out of curves. Sewers and drains, building oil. Application of stereoscopes, parallax bar and elementary topographic. Surveying, photogrammetry setting out of Engineering works equipment and errors of measurement. Areas-Methods of measuring area, division into regular geometrical figures. Trapezoidal and Simpson's rules, coordinates method, the planimeter, volume-primordial formula, grid method and contour area method.

ECE 418: HIGHWAY ENGINEERING (2 Credits)
Introduction - general transportation systems. Highway economics 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 đesign of airports. Airports-introduction to railway engineering. Location surveys and alignment, railroad structures and design.

ECE 419: CIVIL ENGINEERING HYDRAULICS (2 Credits)

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 model. Purpose of models, laws of similitude, types of models and practical model scales, Sediment transport formulae, "land drainage and inland navigation problems.

ENG 418: COMPUTATIONAL METHODS IN ENGINEERING (3 Credits)
Polynomials and their zeros: methods of bisection, Bairstow synthetic division and Lahmer. Divert methods for the solution of linear equations. Convergence; interpolation and differentiation method in Numerical Integration - Newton Coates formulae and finite difference methods. The eigenvalue problem solution of ordinary differential equations. Methods of Taylor, Euler, Predictor-corrector and Range-Kutta

FIFTH YEAR

ECE 500: PROJECT (3 Credit)

ECE 50I: SEMINAR (1 Credit)
The student with work on a project approved by his supervisor.

ECE511: STRUCTURAL MECHANICS I (3 Credits)
Finite difference, finite clement fluid line analysis and strip methods for slabs. Plastic analysis of structures; introduction, stress-strain relation, relation, plastic hinge, collapse mechanism. Simple cases of plastic moment, the shape of plastic zones, bending moment and curvature collapse; simple supported beam, fixed-ended beams, rectangular portal frames. Basic theorems, Basic theorems, Uniqueness theorem, static theorem and kinematics theorems with examples. Effects of axial and shear forces in plasticity analysis of beams and Frames. Matrix analysis of structures; introduction, matrix formulation of force and displacement methods, solution of trusses, plane and space frames, and applications. Elastic instability, continuum of plane strain, plastic flat plates, Computer and torsion.

ECE 512: THEORY OF PLATES AND SHELLS (3 Credit Units)
Presentation of classical theories of coordinates, vector formulation, and basic engineering applications. Emphasis on understanding of geometrical load-carrying characteristics of plate and shell structures and interpretation of numerical solutions. 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.

ECE 514: WATER ENGINEERING RESOURCES AND ENVIRONMENTAL (2 Credits)
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 and coastal hydraulic structures etc.

ECE 515: FOUNDATION ENGINEERING 1 (3 Credit Units)
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.

ECE 516: WATER RESOURCES AND ENVIRONMENTAL ENGINEERING II (3 Credits)
Qualitative evaluation of water quality management alternatives. Legislation pertaining to drinking water and wastewater. Methods for environmental impact analysis, including oxygen balance, toxicity, enrichment/eutrophication. Water and wastewater treatment process technology, advanced wastewater treatment, water recycling/reuse, and industrial wastewater treatment.

ECE 517: GEOTECHNICAL ENGINEERING I (3Credits)

Engineering geology. The behaviour 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.

ECE 518: CONSTRUCTION MANAGEMENT II (3 Credits)
P re construction operations. Issuance of bidding documents. Opening, acceptance and documentation of bids instruction of bidders, irregularities in the preparation and submission of bids. Analysis and comparison of bids. Unbalanced bids. Awarding of contracts. Suggestion for obtaining lowest bids. Value engineering. Management

and payments of contract stages. Meetings and negotiations, construction safety. Responsibilities and rights of the owner, Responsibilities of the Engineer, Registration of Professional Engineers. Litigation arising from supervision of construction projects. Optimization. Linear programming as an aid to decision policies under risk economy. Ergonomics in the design of equipment and processes.

ECE 519: HIGHWAY/TRANSPORTATION ENGINEERING l (3 Credits)

Highway planning and traffic survey. Origin and destination studies, 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 separated intersections, and assessment of intersection capacity. Conflicts at intersections. Traffic management: traffic signal timing, vehicle actuation, elementary signal. Systems, delay studies and one-way streets, design of signal timing, other traffic control systems, signs and line markings. Parking control.

ECE 521: GEOTECHNICAL ENGINEERING II (3Credits)

Earth structures (earth dams) and slope stability, the choices of type of dam design, construction and control of dams, embankments and slopes. Principles of darns 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.

ECE 522: HIGHWAY AND TRANSPORTATION ENGINEERING II (3 Credits)

The management of traffic and design of traffic signals. Parking. Geometric design. Construction methods. Construction material and laboratory tests.

ECE 523: STRUCTURAL MECHANICS II (3Credits)

The analysis of framed structures, planar and 3D using beam-column elements and shear walls and floors. Flexibility and stiffness analyses are performed by generating the matrices and carrying through the analyses step by step with a matrix manipulator program. Computer applications.

ECE 524: PUBLIC HEALTH AND ENVIRONMENTAL ENGINEERING II (2 Credits)

Introduction to public health engineering -- the sanitary engineers 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, dispose and design of systems. Air pollution and control.

ECE 525: CIVIL ENGINEERING PRACTICE (2 Credit)

Civil Engineering works standards and measurements. Measurement process taking off, squaring, abstracting and billing. Measurement of concrete, steel earthwork, demolition and site clearance, brickwork, block work, masonry painting and waterproofing, timber pipe work etc. contracts and sub-contracts: forms of civil engineering contracts: measurement contracts, bill of quantities, schedule rates. Lump sum; cost reimbursement; all in (Turnkey or package). Direct labour. Sub-contracts documents. Works construction and supervision initiation-date commencement,

ECE 526: FOUNDATION ENGINEERING II (2Credits)

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.

ECE 527: DES1GN OF STRUCTURES/STUDIO (2 Credits)

Composite design and construction in steel and reinforced concrete long columns, short columns, slabs, beams, water retaining structures, and retaining walls. Design of structural foundations. Pre-stressed concrete design: principles of pre-stressing, methods of pre-stressing, and losses of pre-stressing. Steal design: plate girders, crane girders, stanchions in multistory buildings, fire and corrosion protection devices. Complete design and detailing of complete structure in steel, reinforced and pre-stressed concrete.

ECE 528: MODERN TRANSPORTATION ENGINEERING II (3 Credits)

An in-depth study and analysis of conventional and emerging public state-of-the-art systems. 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.

ECE 529: PUBLIC HEALTH AND ENVIRONMENTAL ENGINEERING II (3 Credits)

Study of basic laboratory principles of water chemistry, microbiology, and their application to water supply, wastewater treatment and water and land control.

ECE 500: PROJECT (6 Credits)

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	M	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 (NNPCWarri 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 break through. 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. IRO, UZOMA IBE

Engr. Iro, Uzoma Ibe 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

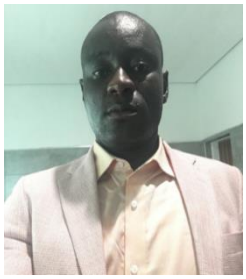
Nwobia Light ihenna is an academic staff at the Department of Civil Engineering, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria. He holds a First Class Honours degree in Civil Engineering from the same institution where he lectures, having won various awards and commendations 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

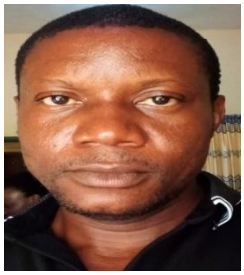
materials, optimization of concrete design, variational calculus, sustainable structural systems and studies that involves artificial intelligence networks. He has over twenty-five scholarly articles published in local and international journals in this field of interest. He can be assessed on ResearchGate 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 Nnamdi Azikiwe 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. He is 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 Chidozie is 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.