



BAYERO UNIVERSITY KANO, NIGERIA

**DEPARTMENT OF CIVIL ENGINEERING
FACULTY OF ENGINEERING**



**OUTCOME BASED EDUCATION
UNDERGRADUATE STUDENTS' HANDBOOK**

*Prepared by the 2024/2025 OBE-Based Accreditation Committee of the
Department*

2025



**DEPARTMENT OF CIVIL ENGINEERING
FACULTY OF ENGINEERING
BAYERO UNIVERSITY, KANO-NIGERIA**

UNDERGRADUATE STUDENTS' HANDBOOK

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Bayero University Kano**

BAYERO UNIVERSITY CREST



The Crest and the Star.

The Crest: Jamiatu Bayero bi Kano (Bayero University, Kano)
(Symbol & Unit of Time)

The Star: *Motto:* WA FAWQA KULLI DHI 'ILMIN 'ALIM i.e
(Guiding Light). “..... but over all Endued with Knowledge is One,
the all-knowing” HQ. 12:76.

The University Colour. Blue.

N/B Transliteration/Translation is from Arabic

1.1 VISION AND MISSION OF THE UNIVERSITY

The vision and mission of Bayero University, Kano is contained in the University's website on https://www.buk.edu.ng/index.php/vision_mission and they are represented as follows:

VISION

The vision is to lead in research and education in Africa.

MISSION

The University's mission is to be committed to addressing African developmental challenges through cutting-edge research, knowledge transfer and training of high-quality graduates.

1.2 MISSION OF THE FACULTY

The Faculty mission is to produce competent and professional engineering graduates with the ability of creativity, innovation, problem solving skills and entrepreneurship; capable of competing in a dynamic world.

1.3 MISSION OF THE DEPARTMENT

The mission of the Department of Civil Engineering is to produce high-grade graduates with innovative skills in solving complex Civil Engineering Problems and capable of conducting independent, original researches in science and engineering.

The Department aims to equip its graduates for career progression or advanced studies in civil engineering and related areas, while also providing service to professional groups and industries according to the highest ethical principles.

OFFICERS AND ESTABLISHMENT

Department of Civil Engineering

Faculty of Engineering
Bayero University, Kano-Nigeria

Year of Establishment: 1978

VICE CHANCELLOR

Professor Haruna Musa

B. Sc, M. Sc, (BUK), Ph.D., (Bristol, UK)

REGISTRAR

Mal. Haruna Aliyu

B. A (Ed), MPPA, (BUK), MNI

DEAN OF FACULTY

Engr. Prof. Abdulsamad Umar Jibia

B. Eng, M. Eng., (BUK), Ph. D., (IIUM), Reg. COREN

HEAD OF DEPARTMENT

Dr Murtala Umar

Associate Professor of Civil Engineering

B. Eng, and M. Eng (BUK), Ph. D. (UTM), MNSE, Reg. COREN

2024/2025 OBE BASED ACCREDITATION COMMITTEE

Prof. Aaron Aboshio, FNSE- Chairman

Dr. Gambo H. Yunusa Secretary

Dr. Aminu Suleiman Member

Dr. Aminu D. Rafindadi Member

Dr. Ibrahim U. Salihi Member

Dr. Abubakar Mohammed Member

MESSAGE FROM THE DEAN, FACULTY OF ENGINEERING

Welcome to the Faculty of Engineering, Bayero University, Kano-Nigeria! I'm thrilled to introduce our Outcome-Based Education (OBE) based Student Handbook. Our faculty is committed to providing you with an exceptional educational experience that prepares you for success in the field of engineering.

OBE is a student-centric approach that focuses on what you, as a learner, need to know, value, and be able to do to achieve a desired level of competence by the time you graduate. This approach ensures that our programs are aligned with industry needs and expectations, making you highly employable upon graduation.

In this handbook, you'll find essential information about our OBE-based programs, including course outlines, learning outcomes, and assessment strategies. Our goal is to empower you with the knowledge, skills, and attitudes required to excel in your chosen career.

I encourage you to take full advantage of the resources and opportunities available in our faculty to maximize your personal and academic growth. I wish you every success in your academic pursuits!

Warm regards,

Engr. Prof. Abdulsamad U. Jibia
*Dean, Faculty of Engineering,
Bayero University, Kano-Nigeria*

MESSAGE FROM THE HEAD, DEPARTMENT OF CIVIL ENGINEERING

A warm welcome to the Department of Civil Engineering at Bayero University, Kano, Nigeria! We are delighted to have you join our vibrant academic community. Our department boasts a team of highly qualified and experienced teaching and non-teaching staff who are deeply committed to providing you with an exceptional educational experience that prepares you for success in the field of civil engineering.

The Department of Civil Engineering offers a range of academic programs, including both undergraduate and postgraduate degrees. Our programs are carefully designed to provide you with a robust foundation in theoretical knowledge, practical skills, and professional competencies, thereby preparing you for a rewarding and successful career in civil engineering.

Our Bachelor of Engineering (Civil Engineering) program is meticulously structured to equip you with the knowledge, skills, and attributes required by employers in Nigeria and beyond. A key feature of our program is our adoption of Outcome-Based Engineering Education (OBE). This approach ensures that our teachings are focused on achieving specific learning outcomes that are directly aligned with industry needs and expectations. Through OBE, you will acquire the knowledge, skills, and competencies that are most valued by employers, enabling you to make a seamless transition into the workforce. You will receive a detailed course outline and reading list at the beginning of each semester, which will guide your studies and help you achieve the desired learning outcomes.

- Staff-Student Relationship: We pride ourselves on our cordial and supportive staff-student relationship. Our staff are readily accessible and willing to assist you with any academic or personal concerns you may have.

- Level Coordinators: To further support your academic journey, each level has a designated Level Coordinator who will serve as your adviser. The Level Coordinator will guide you on course registration, credit load, and other

academic matters, ensuring that you stay on track to achieve your academic goals.

This handbook provides a comprehensive overview of the courses and requirements for your Bachelor of Engineering (Civil Engineering) program. If you have any questions or concerns, please do not hesitate to consult your Level Coordinator. While this handbook is a valuable resource, it is not exhaustive, and its purpose is also to guide you on how to obtain additional information on specific topics as the need arises.

Many key issues and aspects of our program will be discussed in greater detail during our Departmental Orientation Day. We strongly encourage you to refer to this handbook throughout your studies and take full advantage of the resources and opportunities available in the department to maximize your personal and academic growth.

We wish you every success in your academic pursuits and look forward to supporting you throughout your journey with us!

Dr. Murtala Umar

Associate Professor of Civil Engineering
*Head, Department of Civil Engineering,
Bayero University, Kano-Nigeria*

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PREFACE

On behalf of the Vice-Chancellor and Management of Bayero University, Kano,

Nigeria as well as Dean of the Faculty of Engineering and the entire staff members of the Department of Civil Engineering, I warmly welcome you to the Department of Civil Engineering in particular and the Bayero University, Kano, Nigeria, in general. Majority of you are from secondary schools. You are starting a new life in a University environment which is very different from the secondary school's environment. The University environment is different in terms of freedom, lifestyle, and of course. the academic pursuit which is your main reason for being in the University. This Handbook is your roadmap, guiding you and directing you to do what is right and appropriate in the pursuit of your academic objectives.

The Handbook covers a wide range of areas which touch almost all aspects of your study and stay in Bayero University, Kano, Nigeria. The areas covered include: the core values of the University, brief history of the Department; its philosophy, aims and objectives; admission and graduation requirements; academic regulations; the semester system; basic concepts you should be familiar with; lecture attendance requirements; degree classification and academic standing; the all-important examination regulations, examination procedures and discipline; examination and academic misconduct; the various categories of examinations and project/essay related misconduct as well as the appropriate punishments for them; dressing and dress code; and lastly but equally importantly the structure of the Bachelor of Engineering (Civil Engineering).

The core values of the University introduce to you from the onset, the nature of the new environment you find yourself and the rules and regulations governing the operation in the environment. You are required to know them well. The philosophy, aims and objectives of the programme are very clearly spelt out. Admission and graduation requirements are also clearly stated.

You have been admitted to the Department because you fulfilled all the requirements for admission. However, you should know that not even half of the applicants who fulfilled all the admission requirements were admitted due to constraints in facilities. You should, therefore, count yourself lucky to be among those admitted and resolve to make the best use of the opportunity.

With regard to graduation requirements, those of you admitted on the basis of Unified Tertiary Matriculation Examination (UTME) results are required to obtain a minimum of 205 credits before you graduate, while Direct Entry (DE) students must obtain 176 credit units. Furthermore, you must obtain a minimum of CGPA of 1.50, among other requirements. Basic concepts which have direct relevance to you are also spelt out. They include Credit Units (CU), Grade Point Average (GPA), and Cumulative Grade Point Average (CGPA), probation, carry over, withdrawal, spillover, and grading system. They are all fully described in the Handbook. The section on General academic conducts, misconducts and discipline specifies how you are expected to conduct yourself as a student of Bayero University, Kano, Nigeria by displaying an exemplary behaviour in the course of your interaction with members of the University community and by avoiding all forms of misconduct. The all important issues of examination regulations, procedures and discipline as well as examination and academic misconduct are extensively treated for your guidance. You are strongly advised to study them carefully and know them well to avoid unpleasant consequences.

Dressing is another important issue to which your attention is drawn. The type of dress you wear reflects the kind of person you are. The University advises you to always dress decently, examples of which are described. Examples of indecent dressing are also given. They must be avoided. Penalties are also specified for indecent dressing. Finally, the Handbook gives you the insight of the structure of the Bachelor of Engineering (Civil Engineering) which contains the course outline and course description. It is mandatory for you to be very familiar with them.

This Handbook, as pointed out earlier, is produced and distributed to you with the main aim of guiding you and directing you to do what is right and appropriate in the course of your academic pursuit here in Bayero University, Kano, Nigeria. The publication is of great benefit to students, staff members of the Department and all those who seek information about the Department. I urge you to make the maximum use of it. Doing so will ensure that you have a peaceful, pleasant and successful stay in Bayero University, Kano, Nigeria. You should always bear in mind that degree is awarded based on being found worthy

in **character** and **learning**.

All of us in the Department wish you a happy and successful stay in Bayero University, Kano, Nigeria. I wish all of you the best of luck.

Dr. Murtala Umar

Associate Professor of Civil Engineering
*Head, Department of Civil Engineering,
Bayero University, Kano-Nigeria*

DEPARTMENTAL STAFF

1.4 Academic Staff and Areas of Specializations

(i) Academic Staff/Areas of Specialization

S/N	Name	Present Rank	Qualification(s)	Area of Specialization
1	Dr. M. Umar	Assoc. Prof./ HOD	B. Eng, M. Eng., Ph.D, MNSE, COREN	Geotechnical Engineering
2	Prof. M. H. Bichi	Professor	B.Eng, M.Eng., Ph.D, FNSE, MNES, COREN	Water Resources & Environmental Engineering
3	Prof. H. M. Alhassan	Professor	B.Eng, M.Sc. Ph.D, MNSE, MNES, MMSN, COREN	Transportation and Highway Engineering
4	Prof. M. O. A. Mtallib	Professor	B.Eng., M.Sc., Ph.D. MNSE, MMSN, COREN	Construction Management & Technology
5	Prof. O.A.U. Uche	Professor	B. Eng, M. Sc, Ph.D, FNSE, MMSN, COREN	Structures/ Materials
6	Prof. S. Dan'azumi	Professor	B. Eng, M.Eng, Ph.D, MNSE, COREN, MIWA	Water Resources & Environmental Engineering
7	Prof. A. Y. Abdulfatah	Professor	B. Eng, M. Eng, Ph.D, MNSE, COREN, MBGA	Geotechnical Engineering
8	Dr. K. Mohammed	Professor	B. Eng., M.Sc. Ph.D, MNSE, COREN	Water Resources & Environmental Engineering
9	Dr. A. Aboshio	Professor	B. Eng., M.Eng., Ph.D, FNSE, COREN	Structures / Materials
10	Dr. A. Ismail	Professor	B. Eng, M. Eng, Ph.D, MNSE, COREN	Geotechnical Engineering
11	Dr. M. N. Ibrahim	Associate Professor	B. Eng., M.Eng., Ph.D, MNSE, COREN	Transportation and Highway Engineering
12	Dr. M. M. Aliyu	Associate Professor	B. Eng, M.Sc., M.Eng., Ph.D., MNSE, COREN, MNIB, AMNIM	Construction Management & Technology

13	Dr. G. H. Yunusa	Associate Professor	B. Eng., M. Eng., Ph.D, MNSE, COREN	Geotechnical Engineering
14	Dr. A. Suleiman	Senior Lecturer	B. Eng., M. Eng., Ph.D, MNSE, COREN	Transportation and Highway Engineering
15	Dr. N. M. Babangida	Senior Lecturer	B. Eng. M.Eng., Ph.D, MNSE, COREN	Water Resources & Environmental Engineering
16	Dr. I. U. Salihi	Senior Lecturer	B.Eng.; M. Eng., Ph.D, MNSE, COREN	Water Resources & Environmental Engineering
17	Dr. Bishir Kado	Senior Lecturer	B. Eng., M. Eng. Ph.D	Structures / Materials
18	Dr. A. Idris	Senior Lecturer	B. Eng., M.Eng., Ph.D MNSE, COREN	Geotechnical Engineering
20	Dr. Nura. Bala	Senior Lecturer	B. Eng., M. Sc., Ph.D, COREN	Transportation and Highway Engineering
21	Dr. N. Danlami	Senior Lecturer	B. Eng., M.Eng., Ph.D MNSE, COREN	Transportation and Highway Engineering
22	Dr. K. A. Ahmad	Senior Lecturer	B. Eng., M.Eng., Ph.D, MNSE, COREN	Transportation and Highway Engineering
23	Dr. A. D. Rafindadi	Senior Lecturer	B. Eng., M.Sc., Ph.D, MNSE, COREN	Construction Management & Technology
24	Dr. B. W. Isah	Senior Lecturer	B. Eng., M.Tech., Ph.D., COREN	Geotechnical Engineering
25	Dr. A. M. Gora	Senior Lecturer	B. Eng., M.Eng., Ph.D	Structures / Materials
26	Engr. H. A. Daura	Lecturer I	B. Eng, M.Sc, MNSE, COREN	Water Resources & Environmental Engineering
27	Engr. A. B. Yazid	Lecturer I	B. Eng., M. Eng. MNSE, COREN	Water Res. & Environmental Engineering
28	Dr. Musa Adamu	Lecturer I	B. Eng., M.Eng., Ph.D	Structures / Materials
29	Dr. S. I. Haruna	Lecturer I	B. Eng., M. Sc., Ph.D	Structures / Materials
30	Dr. S. Haruna	Lecturer I	B. Eng., M.Tech., Ph.D	Structures / Materials
31	Dr. A. Mohammed	Lecturer I	B. Eng., M. Sc., Ph.D, COREN	Structures / Materials
32	Dr. H. M. Sirajo	Lecturer II	B. Eng., M. Sc., Ph.D	Water Resources & Environmental Engineering

33	Dr. I. Abdulkadir	Lecturer II	B. Eng., M.Eng., Ph.D	Structures / Materials
34	Engr. M. L. Fitto	Assistant Lecturer	B. Eng., M. Eng. MNSE, COREN	Structures / Materials
35	M. M. Abubakar	Graduate Assistant	B. Eng., MNSE	Water Resources & Environmental Engineering

(ii) Technical Staff

S/N	Name	Qualification(s)	Present Rank	Area of Specialization
1	J. D. Aduku	ND, HND, PGDM, M. Sc.	Senior Chief Technologist	Environmental Engineering
2	M. H. Fagge	ND, HND, PGDCE, NATE, COREN	Chief Technologist	Water Resources Engineering
3	Y. H. Gabasawa	ND, HND, PGDCE, MNSE, NATE, COREN	Chief Technologist	Transportation and Highway Engineering
4	(a) H. Shinga	ND, HND, PGDCE, NATE	Asst. Chief Technologist	Geotechnical Engineering
5	A. D. Isyaku	ND, HND, NAEC	Principal Technologist	Structures/Materials
6	A. A. Abdussalam	ND, HND, PGDCE, NATE, COREN	Principal Technologist	Geotechnical Engineering
7	I. S. Muhammed	ND, NAEC	Senior Technologist	Water Resources Engineering
8	A. B. Bello	B.Eng, MNSE, COREN	Senior Technologist	Geotechnical Engineering
9	I. M. Salisu	B.Eng, MNSE, COREN	Technologist I	Structures/Materials
10	F. S. Yakasai	B.Eng	Technologist I	Transportation and Highway Engineering
11	J. L. Abdulsamad	B.Eng	Technologist I	Water Resources Engineering
12	Mukhtar Mu'azu	ND, HND	Technologist II	Environmental Engineering
13	Yasir Haruna	ND	Assistant Technologist I	Environmental Engineering
14	A. S. Muhammad	ND	Assistant Technologist I	Structures/Materials
15	A. Shehu	ND	Laboratory Technician	Environmental Engineering
16	I. S. Abdullahi	ND	Technical Officer	Water Resources Engineering
17	Inuwa Shehu	Trade Test Cert.	Artisan II	Bricklayer
18	Mohammed Idris	Trade Test Cert.	Artisan II	Carpenter

(iii) Administrative Staff

S/N	NAME	QUALIFICATIONS	RANK
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1	Jibril Isa Iya	B.Sc	Senior Conf. Secretary
2	Mukhtari Haruna	-	Head Cleaner
3	Muhammed Umar	-	Head Cleaner
4	Ibrahim Ahmad	SSCE	Driver

Organization structure

The departmental organizational structure is presented in Figure 2.

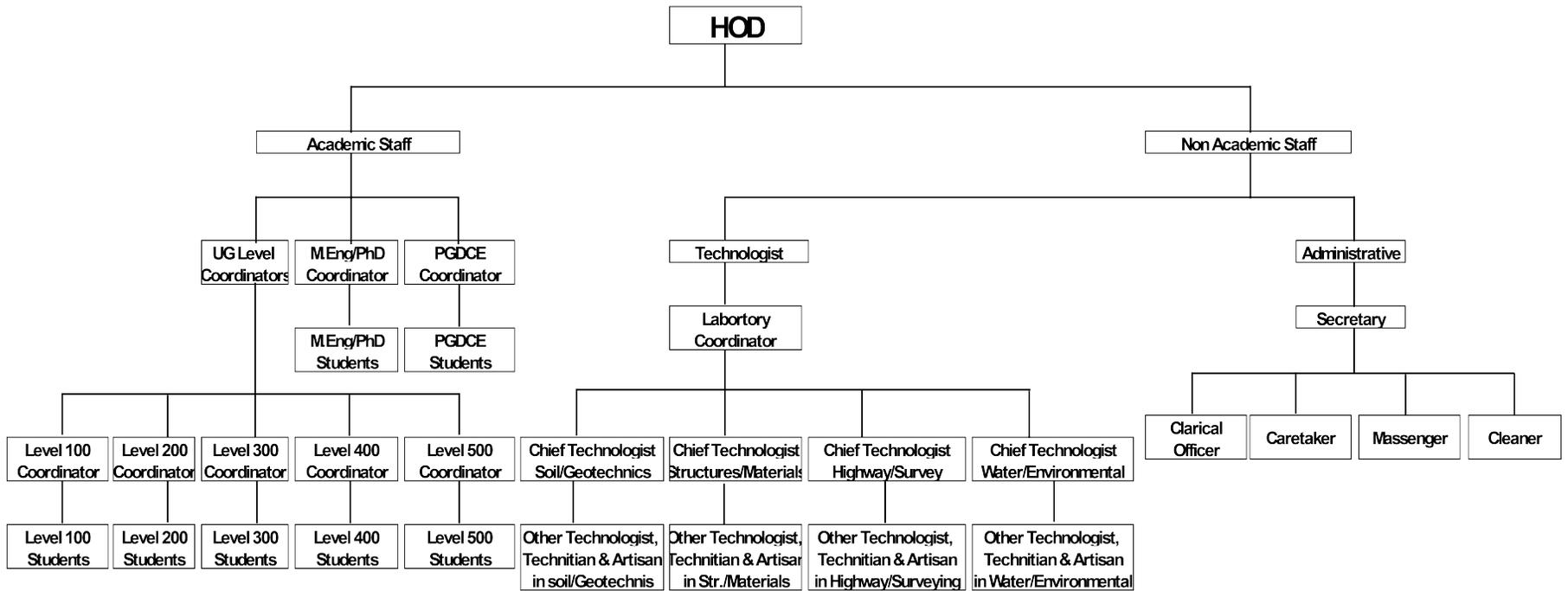


Plate 2, Organizational structure of Department of Civil Engineering, Bayero University, Kano

1.5 List of the Past and Current Head of Departments

S/N	Name	Duration
1	Prof. B. W. Young	1978 - 1984
2.	Dr. S. P. K. Boni	19 84 -1986
3.	Dr. G. G. Kulkarni	1986 - 1988
4.	Dr. S. A. Muyibi	1988 - 1992
5.	Dr. A. H. Gambo	1992 - 1994
6	Mr. T. A. Adedokun	1994 - 1999
7	Engr. M. H. Bichi	1999 - 2002
8.	Engr. H. A. Daura	2002 - 2005
9.	Engr. H. M. Alhassan	2005 - 2009
10.	Engr. H. A. Daura	2009 - 2012
11.	Dr. S. Dan'azumi	2012 - 2017
12.	Dr. A. Y. Abdulfatah	Jan. 2017 - May 2017
13.	Dr. M. O. A. Mtallib	2017 - 2021
14	Dr. K. Mohammed	2021-2023
15	Dr. M. N. Ibrahim	2023-2025

CHAPTER ONE

INTRODUCTION

1.6 History of Civil Engineering Department

The Civil Engineering Department was established as an autonomous Department in the Faculty of Technology Bayero University, Kano in the 1980/81 Session. The main objective was to offer opportunity for great breadth of learning whereby Civil Engineers with proven Engineering abilities can be produced for the country.

The first group of Civil Engineering students were admitted into part one during the 1980/81 session after having a successful completion of a two-year pre-technology programme. The Department initially offered a pre-degree programme with the pre-requisite of a two-year pre-degree study until the 1984/85 academic year. From the 1984/85 session, like all other Departments in the Faculty of Technology, the Civil Engineering Department started a 4-year degree programme until the 1990/91 session when the Department started a 5-year degree programme.

The pioneering batch of Civil Engineering Students received the B.Eng. degree award in June, 1985 with one in First Class Honours, two in Second Class Honours (Upper Division) and three in Second Class Honours (Lower Division) degree classifications. Six students who were in Part III (Final year) class of the old 3-year programme completed their B. Eng degree course in June, 1986. Those that were admitted for the levels 100 and 200 of the four-year programme received their degrees in the 1987/88 session while those admitted for the new five-year programme started graduating from the 1994/95 session.

In order to produce intellectual and practical people who can combine their skills to create safe and economic designs which must be environmentally and socially acceptable to the society in which we live, the Department of Civil Engineering ensures that in addition to sound theoretical background, students are thoroughly exposed to extensive and relevant laboratory experimentation and exercises. Their practical skills, developed in the central workshop and the Civil Engineering Laboratories are complemented by a number of work experience programmes. The programmes include an in-house eight weeks Students Work Experience Programme (SWEP) in Level 100, a three months supervised Student Industrial Works Experience Scheme (SIWES I) in Level 300 and a six months supervised Student Industrial Works Experience Scheme (SIWES

II) in 400 are conducted in the whole of the second semester of the session. This helps the students to relate academic work with practical industrial realities and capabilities. The overall goal of the Department is to produce Civil Engineers who are relevant to the engineering manpower requirement in the public and private sectors of the economy and who can initiate as well as carry out engineering designs, engage in industrial management and pursue research and development.

The Department is adequately equipped in the following laboratories namely: Material Testing, Public Health Engineering, Soil Mechanics, Structural Engineering, Transportation, Survey and Hydraulics/Hydrology. The Department works in close cooperation with related states and Federal Institutions. This is to get practical inputs to support the students' course work and equally takes interest in the productivity and performance of students even after graduation.

Post graduate courses leading to Post Graduate Diploma, Master's and Ph. D. degrees started much later. Masters and PGDCE programmes were started in 1999/2000 session while Ph. D. programme started in 2007/2008 session with the staff of the Department only. The Department started admission of external candidates into the Ph. D. programme in 2013/2014 session.

1.7 Philosophy, Aim and Objectives of B. Eng. (Civil) Programme

1.7.1 Philosophy

To achieve the national goals and objectives of industrialization and self-reliance, the programme is geared towards the development of a thorough practice in training, which includes early broad-based training in general engineering, practical application to engineering processes, adequate training in human and organizational behaviour. Therefore, the general *philosophy* of the programme is to produce graduates with high academic standard and adequate practical background for self-employment as well as being of immediate value to industry and the community in general.

1.7.2 Aim and Objectives of the Programme

The overall aim of the programme is in consonance with the realization of National needs and aspirations vis-à-vis industrial development and

technological emancipation. The programme gives the minimum academic standards required to meet these needs and to produce graduates with sufficient academic background and practical experience who would be able to rise to the challenges of a developing economy like ours. Some of the objectives of the programme include producing graduates who will be able:

- To design engineering projects and supervise their construction.
- To design and develop new products and production techniques in industries.
- To install and maintain complex engineering systems so that they can perform optimally in our environment.
- To adapt and adopt exogenous technology in order to solve local engineering problems.
- To be able to exercise original thought, have good professional judgment and be able to take responsibility for the direction of important tasks.
- To be able to manage people, funds, materials, and equipment.
- To improve on indigenous technologies so as to enhance local problem-solving capability.

1.8 Admission requirements of the Programme

The minimum requirement for admission into B. Eng Civil Engineering programme is in accordance with the NUC guidelines.

The main entry point into the programme is the Secondary School Certificate Examination (SSCE) including West African Examination Council (WAEC), National Examination Council (NECO), National Business and Technical Examinations Board (NABTEB) or their equivalence. Candidates must satisfy all the University entry requirements plus passes at credit level in at least five subjects (including English, Mathematics, Physics and Chemistry) obtained at not more than two sittings.

(a) Level 100

Admission into Level 100 requires, in addition to section 1.3, an acceptable performance in the Unified Tertiary Matriculation Examination (UTME) in the relevant subjects and an acceptable pass in the post-UTME examination organized by the Bayero University Kano. The required subject combination for

the UTME is English Language, Mathematics, Physics and Chemistry. Candidates with wrong subject combination at UTME automatically disqualify themselves.

(b) Level 200 (Direct Entry)

Candidates who apply for direct entry are admitted into Level 200, provided they satisfy the following admission requirements in addition to the requirements in Section 1.3.

- i. A National Diploma in Civil Engineering with a minimum of Upper, or
- ii. Possess the required number of points in the Interim Joint Matriculation Board (IJMB) examination. In this case the required subjects are; Mathematics, Physics and Chemistry.

1.9 Duration of the Programme

The minimum duration of the programme is Five (5) academic sessions for candidates who enter through UTME. Candidates admitted through Direct Entry will spend a minimum of Four (4) academic sessions, provided that they satisfy all the other University requirements.

1.10 Graduation Requirements

All courses in Levels 100 to 400 are compulsory. In the final year (Level 500), students are required to register for all the core courses and at least 6 credits from option courses. However, unlike in the other program of the faculty, a student cannot graduate without passing the 6 credits optional courses in the final year. To be eligible for the award of a B. Eng Civil, a student must pass one of the following depending of mode of entry.

- (i) Level 100 (UTME) 205 Credit units
- (ii) Level 200 (DE) 175 Credit units

Student must also pass all core courses, the final year project, the 40-weeks industrial training (SWEP and SIWES) and all GSP/EEP courses.

1.11 Minimum graduation requirement (MCR) for Civil Engineering

Component Courses	Total Credit Unit	
	Admission through	Admission through

	UTME	DE
Core/Cognate	178	148
Industrial Training	07	07
Elective	06	06
General Studies	10	10
Entrepreneurial	04	04
Total	205	175

CHAPTER TWO

OUTCOME BASED EDUCATION

2.1 Outcome-Based Education (OBE) Overview

Outcome-Based Education (OBE) is a pedagogical model that entails the restructuring of curriculum, pedagogy, and assessment practices to reflect the achievement of high-order learning, as opposed to a mere accumulation of course credits. OBE places emphasis on what is learned, and is a student-centric model that incorporates real-world scenarios.

OBE is an education system built on specific outcomes. It focuses on the skill sets students acquire following the completion of their studies. Activities in and outside the classroom are designed in a manner so as to help students achieve these outcomes. This approach empowers students to choose what they would like to study and how they would like to study it. Not only does it adapt to a learner's strengths and weaknesses, but it also provides sufficient time to attain proficiency and fluency in the subject matter. The various components of the OBE process are illustrated in Figure 1.

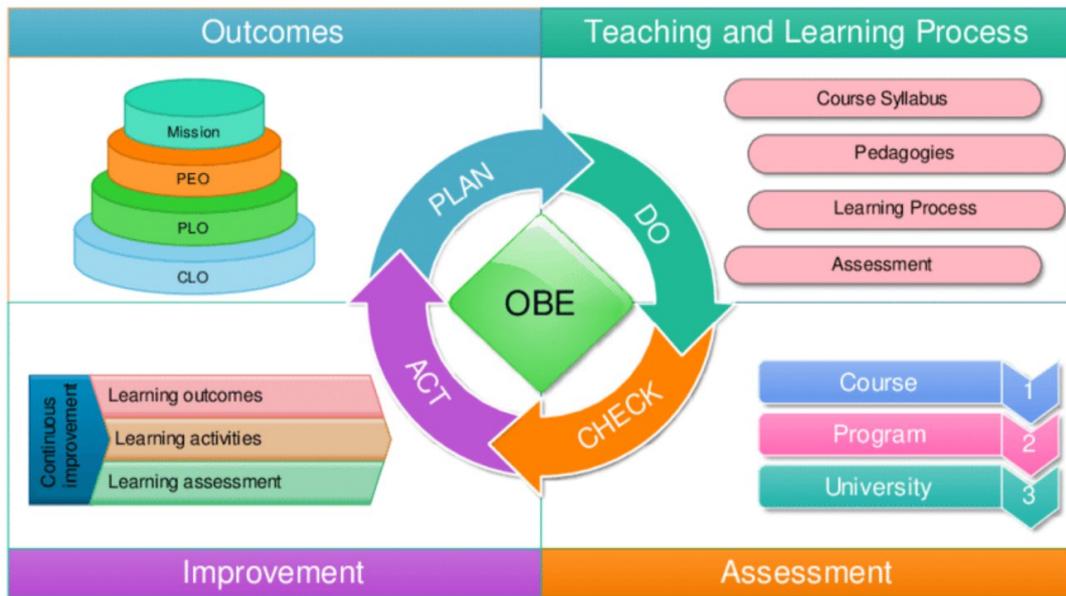


Figure 1 OBE Process

2.2 Programme Education Objectives (PEOs)

The Programme Education Objectives (PEOs) for the B. Eng. Civil Engineering Programme are split into four key areas, aligning with the mission statements of Bayero University, Kano-Nigeria, the Faculty of Engineering, and the Department of Civil Engineering. The PEOs outline the expected abilities of graduates of the Bachelor of Engineering (Civil) programme between three (3) to five (5) years after their graduation. The PEOs are:

1. PEO1: Addressing Employment Challenges - Employ the in-depth knowledge and practical skills acquired to successfully establish and manage entrepreneurial concerns.
2. PEO2: Addressing Engineering Challenges - Recognize and implement effective solutions to address current and future civil engineering challenges in Nigeria and other African societies.
3. PEO3: Professional Services with High Ethical Standard - Provide professional services with high ethical standards and commitment to public safety and welfare, while contributing to the advancement of the civil engineering profession.
4. PEO4: Career Development - Hold leadership positions in civil engineering and pursue advanced studies within Nigeria and globally.

These PEOs are core to the philosophy and objectives of the B. Eng. Civil Engineering Programme and are prominently published in this students' handbook and displayed on banners at strategic locations within the Department

2.3 Programme Education Objectives-Mission Mapping

The Programme Education Objectives (PEOs) are mapped to the missions of Bayero University, Kano, the Faculty of Engineering, and the Civil Engineering Department.

The PEOs are aligned with the missions at various levels, as shown in Table 1, which illustrates the mapping of PEOs to the university, faculty, and department missions. This mapping ensures that the PEOs are consistent with the overall goals and objectives of the university, faculty, and department.

Table 1: Mapping of the University, Faculty and the Department’s Mission Statements to PEOs

LEVEL	MISSION COMPONENTS	PEO ₁ Engineering Education	PEO ₂ Addressing Engineering Challenges	PEO ₃ Professional Services with High Ethical Standard	PEO ₄ Career Development
BAYERO UNIVERSITY, KANO	Excellence in Knowledge Delivery	/			/
	Lead in Research in Nigeria and Africa		/	/	
FACULTY OF ENGINEERING BAYERO UNIVERSITY	Competent Engineering Graduate	/	/		/
	Lead in Engineering Discipline	/		/	
	Find creating solutions to engineering problems	/	/	/	
CIVIL ENGINEERING DEPARTMENT	Addressing Engineering Challenges		/	/	
	Professional Services with High Ethical Standard	/	/	/	/
	Career Development	/			/

2.4 Programme Outcomes (POs)

The Programme Outcomes (POs) are attributes that are expected to be attained by students upon completion of their Bachelor of Civil Engineering programme. Our POs are adopted COREN POs listed as follows:

1. PO1: Engineering Knowledge - Graduates will be able to apply their knowledge of mathematics, science, and engineering fundamentals to solve complex civil engineering problems, such as designing structures, managing water resources, or developing transportation systems.

2. PO2: Problem Analysis - Graduates will be able to identify and analyze complex civil engineering problems, break them down into manageable components, and develop solutions using fundamental principles, such as mechanics, materials science, and hydraulics.

3. PO3: Design/Development of Solutions - Graduates will be able to design and develop solutions to civil engineering problems, taking into account societal and environmental needs, such as creating sustainable infrastructure, ensuring public safety, and promoting environmental stewardship.

4. PO4: Investigation - Graduates will be able to conduct investigations of complex civil engineering problems using research-based knowledge and methods, such as collecting and analyzing data, conducting experiments, and simulating scenarios.

5. PO5: Modern Tool Usage - Graduates will be able to use modern engineering tools and software, such as computer-aided design (CAD) software, structural analysis software, and geographic information systems (GIS), to solve civil engineering problems efficiently and effectively.

6. PO6: The Engineer and Society - Graduates will understand the role of civil engineers in society, including their responsibilities to protect public health and safety, promote social justice, and contribute to the economic development of communities.

7. PO7: Environment and Sustainability - Graduates will understand the impact of civil engineering solutions on the environment and promote sustainable

development, such as minimizing waste, reducing energy consumption, and preserving natural resources.

8. PO8: Ethics - Graduates will apply ethical principles and commit to professional ethics in civil engineering practice, such as ensuring honesty, integrity, and transparency in their work.

9. PO9: Individual and Team Work - Graduates will be able to function effectively as an individual and as a member of a team in civil engineering projects, including communicating effectively, collaborating with stakeholders, and leading or participating in teams.

10. PO10: Communication - Graduates will be able to communicate effectively on civil engineering activities with the engineering community and society at large, including writing reports, presenting findings, and engaging in public outreach.

11. PO11: Project Management and Finance - Graduates will demonstrate knowledge and understanding of civil engineering project management and finance principles, including budgeting, scheduling, and risk management.

12. PO12: Lifelong Learning - Graduates will engage in lifelong learning and continuing professional development in the field of civil engineering, including staying up-to-date with new technologies, methods, and best practices, and pursuing advanced degrees or certifications.

2.5 Performance Indicators (PIs) for the Programme Outcomes (POs) with Detailed Rubric

The Performance Indicators (PIs) for the Programme Outcomes (POs) in Civil Engineering are specific statements that describe the expected performance of students in achieving the program's learning outcomes. These PIs serve as a guide for students to understand what is expected of them in terms of knowledge, skills, and attitudes throughout their program.

1. PO1: Engineering Knowledge

- PI1: Applies mathematical concepts to solve civil engineering problems (Assessment: Exam, Project)

- Expected Level: Students should be able to apply mathematical concepts, such as calculus and statistics, to solve complex civil engineering problems with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to apply mathematical concepts correctly to solve civil engineering problems. Demonstrates a lack of understanding of fundamental mathematical concepts.

- 40-49%: Applies mathematical concepts with significant errors or omissions. Shows some understanding, but lacks proficiency in applying mathematical concepts to solve civil engineering problems.

- 50-59%: Applies mathematical concepts with some errors or omissions. Demonstrates a basic understanding of mathematical concepts, but may struggle to apply them correctly in complex problems.

- 60-69%: Applies mathematical concepts correctly with minor errors. Shows a good understanding of mathematical concepts and can apply them to solve civil engineering problems with some accuracy.

- 70-100%: Applies mathematical concepts flawlessly to solve complex civil engineering problems. Demonstrates a thorough understanding of mathematical concepts and can apply them with precision and accuracy.

2. PO2: Problem Analysis

- P11: Identifies key parameters and constraints in civil engineering problems (Assessment: Case Study, Project)

- Expected Level: Students should be able to identify key parameters and constraints in complex civil engineering problems with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to identify key parameters and constraints in civil engineering problems. Demonstrates a lack of understanding of problem analysis.

- 40-49%: Identifies some key parameters and constraints with significant errors or omissions. Shows some understanding, but lacks proficiency in identifying key parameters and constraints.

- 50-59%: Identifies key parameters and constraints with some errors or omissions. Demonstrates a basic understanding of problem analysis, but may struggle to identify all key parameters and constraints.

- 60-69%: Identifies most key parameters and constraints with minor omissions. Shows a good understanding of problem analysis and can identify key parameters and constraints with some accuracy.

- 70-100%: Identifies all key parameters and constraints in complex civil engineering problems. Demonstrates a thorough understanding of problem analysis and can identify key parameters and constraints with precision and accuracy.

3. PO3: Design/Development of Solutions

- P11: Designs solutions that meet societal and environmental needs (Assessment: Project, Presentation)

- Expected Level: Students should be able to design solutions that meet societal and environmental needs, such as sustainable infrastructure, with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to design solutions that meet societal and environmental needs. Demonstrates a lack of understanding of design/development of solutions.

- 40-49%: Designs solutions with significant errors or omissions that meet societal and environmental needs. Shows some understanding, but lacks proficiency in designing solutions.

- 50-59%: Designs solutions with some errors or omissions that meet societal and environmental needs. Demonstrates a basic understanding of design/development of solutions, but may struggle to design effective solutions.

- 60-69%: Designs solutions that meet most societal and environmental needs with minor omissions. Shows a good understanding of design/development of solutions and can design effective solutions with some accuracy.

- 70-100%: Designs solutions that fully meet societal and environmental needs. Demonstrates a thorough understanding of design/development of solutions and can design effective solutions with precision and accuracy.

4. PO4: Investigation

- PI1: Conducts literature reviews to inform civil engineering investigations (Assessment: Report, Presentation)

- Expected Level: Students should be able to conduct thorough literature reviews to inform civil engineering investigations with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to conduct adequate literature reviews. Demonstrates a lack of understanding of investigation. Does not demonstrate the ability to search, collect, and analyze relevant literature.

- 40-49%: Conducts literature reviews with significant errors or omissions. Shows some understanding, but lacks proficiency in conducting literature reviews. May struggle to identify key sources or synthesize relevant information.

- 50-59%: Conducts literature reviews with some errors or omissions. Demonstrates a basic understanding of investigation, but may struggle to conduct thorough literature reviews. May not fully synthesize relevant information.

- 60-69%: Conducts adequate literature reviews with minor omissions. Shows a good understanding of investigation and can conduct literature reviews with some accuracy. Can identify key sources and synthesize relevant information, but may not fully critically evaluate the literature.

- 70-100%: Conducts comprehensive and thorough literature reviews. Demonstrates a thorough understanding of investigation and can conduct literature reviews with precision and accuracy. Can critically evaluate the

literature, identify key sources, and synthesize relevant information to inform civil engineering investigations.

5. PO5: Modern Tool Usage

- PI1: Uses software tools to solve civil engineering problems (Assessment: Project, Assignment)

- Expected Level: Students should be able to use software tools, such as CAD software and structural analysis software, to solve complex civil engineering problems with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to use software tools correctly to solve civil engineering problems. Demonstrates a lack of understanding of modern tool usage. Does not demonstrate the ability to select and apply relevant software tools.

- 40-49%: Uses software tools with significant errors or omissions. Shows some understanding, but lacks proficiency in using software tools. May struggle to select appropriate software tools or apply them correctly.

- 50-59%: Uses software tools with some errors or omissions. Demonstrates a basic understanding of modern tool usage, but may struggle to use software tools correctly. May not fully understand the capabilities and limitations of software tools.

- 60-69%: Uses software tools correctly with minor errors. Shows a good understanding of modern tool usage and can use software tools with some accuracy. Can select and apply relevant software tools, but may not fully optimize their use.

- 70-100%: Uses software tools flawlessly to solve complex civil engineering problems. Demonstrates a thorough understanding of modern tool usage and can use software tools with precision and accuracy. Can optimize the use of software tools to solve complex problems efficiently.

6. PO6: The Engineer and Society

- PI1: Understands the role of civil engineers in society (Assessment: Quiz, Assignment)

- Expected Level: Students should be able to explain the role of civil engineers in society, including their responsibilities to protect public health and safety, with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to understand the role of civil engineers in society. Demonstrates a lack of understanding of the engineer and society. Does not demonstrate an awareness of the responsibilities of civil engineers.

- 40-49%: Shows some understanding of the role of civil engineers in society, but with significant errors or omissions. May not fully understand the responsibilities of civil engineers to protect public health and safety.

- 50-59%: Demonstrates a basic understanding of the role of civil engineers in society, but may struggle to explain their responsibilities. May not fully appreciate the importance of civil engineers in society.

- 60-69%: Shows a good understanding of the role of civil engineers in society and can explain their responsibilities with some accuracy. Can

appreciate the importance of civil engineers in society, but may not fully understand the nuances of their role.

- 70-100%: Demonstrates a thorough understanding of the role of civil engineers in society and can explain their responsibilities with precision and accuracy. Can fully appreciate the importance of civil engineers in society and understand the nuances of their role.

7. PO7: Environment and Sustainability

- P11: Identifies environmental impacts of civil engineering solutions (Assessment: Project, Report)

- Expected Level: Students should be able to identify environmental impacts of civil engineering solutions, such as pollution and climate change, with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to identify environmental impacts of civil engineering solutions. Demonstrates a lack of understanding of environment and sustainability. Does not demonstrate an awareness of the potential environmental consequences of civil engineering solutions.

- 40-49%: Identifies some environmental impacts with significant errors or omissions. Shows some understanding, but lacks proficiency in identifying environmental impacts. May struggle to recognize the potential environmental consequences of civil engineering solutions.

- 50-59%: Identifies environmental impacts with some errors or omissions. Demonstrates a basic understanding of environment and sustainability, but may struggle to fully identify all potential environmental impacts.

- 60-69%: Identifies most environmental impacts with minor omissions. Shows a good understanding of environment and sustainability and can identify environmental impacts with some accuracy. Can recognize the potential environmental consequences of civil engineering solutions, but may not fully consider all factors.

- 70-100%: Identifies all environmental impacts of civil engineering solutions. Demonstrates a thorough understanding of environment and sustainability and can identify environmental impacts with precision and accuracy. Can fully consider all factors and recognize the potential environmental consequences of civil engineering solutions.

8. PO8: Ethics

- P11: Applies ethical principles in civil engineering decision-making (Assessment: Case Study, Report)

- Expected Level: Students should be able to apply ethical principles, such as honesty and integrity, in civil engineering decision-making with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to apply ethical principles in civil engineering decision-making. Demonstrates a lack of understanding of ethics. Does not demonstrate an awareness of the importance of ethics in civil engineering.

- 40-49%: Applies ethical principles with significant errors or omissions. Shows some understanding, but lacks proficiency in applying ethical principles. May struggle to recognize the importance of ethics in civil engineering decision-making.

- 50-59%: Applies ethical principles with some errors or omissions. Demonstrates a basic understanding of ethics, but may struggle to fully apply ethical principles in civil engineering decision-making.

- 60-69%: Applies ethical principles with minor errors. Shows a good understanding of ethics and can apply ethical principles with some accuracy. Can recognize the importance of ethics in civil engineering decision-making, but may not fully consider all factors.

- 70-100%: Applies ethical principles flawlessly in civil engineering decision-making. Demonstrates a thorough understanding of ethics and can apply ethical principles with precision and accuracy. Can fully consider all factors and recognize the importance of ethics in civil engineering decision-making.

9. PO9: Individual and Team Work

- PI1: Functions effectively as an individual in civil engineering projects (Assessment: Project, Peer Review)

- Expected Level: Students should be able to function effectively as an individual in civil engineering projects with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to function effectively as an individual in civil engineering projects. Demonstrates a lack of understanding of individual and team work. Does not demonstrate the ability to work independently or take responsibility for individual tasks.

- 40-49%: Functions with significant errors or omissions as an individual in civil engineering projects. Shows some understanding, but lacks proficiency in functioning effectively as an individual. May struggle to work independently or take responsibility for individual tasks.

- 50-59%: Functions with some errors or omissions as an individual in civil engineering projects. Demonstrates a basic understanding of individual and team work, but may struggle to fully function effectively as an individual.

- 60-69%: Functions effectively as an individual in civil engineering projects with minor errors. Shows a good understanding of individual and team work and can function effectively as an individual with some accuracy. Can work independently and take responsibility for individual tasks, but may not fully demonstrate initiative or leadership.

- 70-100%: Functions exceptionally well as an individual in civil engineering projects. Demonstrates a thorough understanding of individual and team work and can function effectively as an

10. PO10: Communication

- PI1: Communicates technical information effectively to stakeholders (Assessment: Presentation, Report)

- Expected Level: Students should be able to communicate technical information effectively to stakeholders with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to communicate technical information effectively to stakeholders. Demonstrates a lack of understanding of communication. Does not demonstrate the ability to convey technical information clearly or accurately.

- 40-49%: Communicates technical information with significant errors or omissions. Shows some understanding, but lacks proficiency in communicating technical information. May struggle to convey technical information clearly or accurately to stakeholders.

- 50-59%: Communicates technical information with some errors or omissions. Demonstrates a basic understanding of communication, but may struggle to fully communicate technical information effectively to stakeholders.

- 60-69%: Communicates technical information effectively with minor errors. Shows a good understanding of communication and can communicate technical information with some accuracy. Can convey technical information clearly and accurately to stakeholders, but may not fully tailor the communication to the audience.

- 70-100%: Communicates technical information exceptionally well to stakeholders. Demonstrates a thorough understanding of communication and can communicate technical information with precision and accuracy. Can tailor the communication to the audience and convey technical information clearly and effectively.

11. PO11: Project Management and Finance

- P11: Demonstrates understanding of project management principles (Assessment: Exam, Project)

- Expected Level: Students should be able to demonstrate understanding of project management principles, such as budgeting and scheduling, with 70% accuracy.

- **Rubric:**

- 0-39%: Fails to demonstrate understanding of project management principles. Demonstrates a lack of understanding of project management and finance. Does not demonstrate an awareness of the importance of project management in civil engineering.

- 40-49%: Demonstrates some understanding of project management principles, but with significant errors or omissions. Shows some understanding, but lacks proficiency in project management and finance. May struggle to apply project management principles in civil engineering projects.

- 50-59%: Demonstrates a basic understanding of project management principles, but may struggle to fully apply them in civil engineering projects. May not fully understand the importance of project management in civil engineering.

- 60-69%: Demonstrates a good understanding of project management principles and can apply them with some accuracy in civil engineering

projects. Can understand the importance of project management in civil engineering, but may not fully consider all factors.

- 70-100%: Demonstrates a thorough understanding of project management principles and can apply them with precision and accuracy in civil engineering projects. Can fully consider all factors and understand the importance of project management in civil engineering.

MAPPING OF PEOs TO POs/GRADUATE ATTRIBUTES

Mapping of POs to PEOs

PROGRAMME OUTCOMES	PEO ₁	PEO ₂	PEO ₃	PEO ₄
Engineering Knowledge	✓			
Problem Analysis		✓	✓	
Design/Development of Solutions			✓	✓
Investigation			✓	
Modern Tool Usage	✓		✓	✓
The Engineer and Society		✓		
Environment and sustainability		✓	✓	
Ethics			✓	
Individual and Teamwork			✓	✓
Communication	✓		✓	✓
Project management		✓		✓
Lifelong Learning	✓		✓	✓
Legal Awareness	✓	✓		
Entrepreneurship and Innovation	✓	✓	✓	

Annex B-2: Mapping of CLOs to POs

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV3301: PRINCIPLES OF CONSTRUCTION												
Understand and clearly differentiate between building and civil engineering works	2							3				
Describe construction tools used in building and civil engineering works	2											
Describe construction techniques used in building and civil engineering works			2	3							3	
Describe various types of construction techniques used in building and civil engineering works												
Describe procedure of executing all civil engineering projects			1			3						

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV3302: CIVIL ENGINEERING MATERIALS												
Explain the suitability of the use of the following as civil engineering materials: concrete, structural steel (and other important structural metals), timber, masonry;	1											
Conduct tests of engineering properties on civil engineering materials and utilize these for quality control;				3	2							1
Explain the limitations of these materials under various uses; and					2							
Characterize variability and uncertainty associated with these materials.						3						

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV3307: DESIGN OF REINFORCED CONCRETE STRUCTURES I												
Describe and distinguish between the different design philosophies employed in design of engineering structures	2		3									

Describe the composite action of reinforced concrete materials for structural applications			1		2							
Design Reinforced Concrete sections under flexure, shear and bond	1		1									
Evaluate reinforced concrete beam elements against deflections, cracks and bond					1							
Analyse frame structure under vertical and horizontal loads					1							

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV3303: FLUID MECHANICS II												
Distinguish laminar from transitional and turbulent flows using the concept of Reynolds Number	1											
Utilize boundary layer theory to estimate Lift and Drag					2							
Derive the distribution of velocity and shear stress in laminar and turbulent flows respectively past flat plates and in circular conduits, and utilisation to obtain total flow, head loss, etc					1							
Undertake similitude, development of physical hydraulic models, and scaling of the results from model to prototype			2		2							
Analyze ideal fluid flow into sources from sinks, past circular and ellipsoidal bodies concerning doublets and flow nets					2							
Analyze flow in pipes in series, parallel and any network, which may include pumps					2							
Obtain simplified estimates of forces exerted by flow in pipes due to rapid closing or opening of valves, and the use of surge tanks to reduce these forces			2		3							

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
C1V3304: SOIL MECHANICS I												

Describe and solve volume-mass relationship equations for soils.	2				2							
Classify soils for engineering application.	1											
Determine seepage and permeability and solve for flux and flow behaviour in soils			1									
Understand the concept and theory of shear strength, determine shear strength parameters using direct shear, triaxial, and vane shear tests and application of shear strength parameters in design			1		2							
Understand the concept of stress distribution in soil	2		3									

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV3308: STRENGTH OF MATERIALS												
Describe behaviour of engineering materials and relationship between bending moment, shear force and applied load	1				3							
Analyse beams and portal frames under varied loading conditions		2			1							
Analyse and evaluate geometric properties of sections		3			2							
Determine deflections and stresses in beam using analytical approaches					2							
Apply analytical skills in determining Creep, Fatigue, Fracture and Stress			2		2							

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV3309: STRUCTURAL ANALYSIS I												
Analyse beams with internal hinges and/rollers under simple and complex loading conditions		3			1							
Analyse three hinges portal frames and arches under vertical and horizontal loadings					2							

Analyse plane and simple space trusses under vertical and horizontal loadings					3							
Apply graphical method in analysis of structural elements					3							
Apply strain energy method and associated theorems in analyses of determinate structural elements			2		3							
COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV3401: ENGINEERING GEOLOGY												
Understand the concept of stress distribution in soil	1								3			
To understand the surface and subsurface processes and how rock and soil are formed from these processes	2								3			
Identify rocks based on their mineral composition in the laboratory and field	2											3
Understand and identify geological structures such as fold, fault, bedding plane foliation and how they affect Civil engineering constructions	2				3							
Be able to draw simple geologic formation.					3							
Learn to how to determine engineering properties of subsoil materials and groundwater prospectus of an area					3							
Understand the concept of fossils and geological time	3	1			2							
Understand the basic geology of Nigeria	1							1	2			

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV3402: CIVIL ENGINEERING DRAWING												
Apply the principles of basic technical skill and produce civil engineering drawings.			3									
Understanding and interpretation of the elements of Civil engineering drawings	2											
Utilise CAD software to produce civil engineering drawings.					3		1					1

<p style="text-align: center;">COURSE LEARNING OUTCOMES By the end of the course, students should be able to :</p>	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV3403: ENGINEERING SURVEYING, I												
Demonstrate a comprehensive understanding of surveying instruments, including their types, adjustments, and practical uses in various surveying applications.	2											3
Apply the principles of error theory to identify, detect, and eliminate errors in surveying measurements, ensuring accuracy and reliability in surveying data.					2							
Conduct chain surveying operations proficiently, including measurement techniques, data recording, and plotting, to accurately map land areas and determine distances and angles.			2									
Utilize compass surveying techniques to establish direction and orientation, as well as to measure angles and distances, for mapping and land surveying purposes.			2									
Employ plan table surveying methods for mapping and recording topographic features of the land surface, including the use of graphical representations and tabular data.					3							
Perform leveling operations, including tacheometric, trigonometric, altimetric, and geometric leveling, to determine elevations and establish height differences between points accurately.			2		3							
Execute theodolite traversing procedures to measure horizontal and vertical angles, establish control points, and traverse accurately across a survey area.			2		2							
Engage in laboratory works involving various surveying techniques, including chain surveying, compass surveying, plane tabling, levelling (including perimetric, grid, profile, and cross-sectioning), and traversing (4th order), to apply theoretical knowledge to practical surveying tasks and develop essential surveying skills.	2											1

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
EGR3101: ENGINEER IN SOCIETY II												
Analyze the impacts of engineering activities on society and the environment					3			1				
Apply ethical frameworks and principles to engineering decision-making				1			1					
Demonstrate an understanding of the social, economic, and political context in which engineering projects are conducted								1		2		
Communicate effectively with diverse stakeholders and consider their perspectives in engineering projects							1				1	

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
EGR3102: TECHNICAL WRITING AND PRESENTATION												
Apply the principles of effective communication				1			1					
Demonstrate professional use of the English language					2							
Master the principles of technical writing	1						1					
Delivere compelling oral presentations of technical ideas							3				1	2

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
EGR3301:ENGINEERING MATHEMATICS												
Solve first-order differential equations, including special types of second-	1								3			

order equations, with a deep understanding of their solutions and applications.												
Analyze and solve higher-order linear equations with constant coefficients, including partial differential equations, such as Poisson's and Laplace's equations, with an emphasis on understanding their physical interpretations and mathematical properties.					2							
Apply mathematical techniques, including simple solutions, Legendre functions, and Hermite functions, to solve differential equations arising in various physical phenomena, such as heat transfer, wave propagation, and steady-state problems.			2									
Utilize differential equations in different coordinate systems to solve boundary value problems and address practical applications in diverse fields, including engineering, physics, and mathematics.			2									
Demonstrate proficiency in utilizing Laplace and Fourier transforms as powerful mathematical tools to solve differential equations efficiently and analyze complex systems in both time and frequency domains.					2				3			

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
EGR3302: COMPUTATION TECHNIQUES												
Analyze and solve linear and non-linear equations using numerical methods, including finite differences operators, flow diagrams, and charts, with an emphasis on understanding their applications in various fields.					1							
Utilize numerical techniques for solving simple algebraic and transcendental equations, employing both direct methods for linear equations and iterative methods for matrix inversion to obtain accurate solutions efficiently.			2									
Apply Newton-Cotes formulae for numerical integration and differentiation, demonstrating an understanding of their limitations and accuracy in approximating definite integrals and derivatives.			2								2	
Gain an introduction to linear programming techniques, exploring the			2		2							2

optimization of objective functions subject to linear constraints and developing skills in formulating and solving linear programming problems.												
Investigate methods for finding zeros of polynomials and other functions, including bisection, Newton, Bairstow, synthetic division, and Lehinear and Convergence methods, with a focus on selecting appropriate algorithms for efficient and accurate solutions.					2							
Master techniques for solving ordinary differential equations, including Taylor series, Euler's method, predictor-corrector methods, and Runge-Kutta methods, understanding their stability, accuracy, and convergence properties in various applications.					1						2	

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
EGR3311: COMPUTER APPLICATIONS												
Demonstrate a comprehensive understanding of operating systems and computer programming concepts.	1											2
Apply algorithms, flow charts, and pseudocodes to solve computational problems.			2									
Utilize programming languages, including FORTRAN, BASIC, and PASCAL, for software development and problem-solving tasks.	2										2	2
Navigate and utilize MS-DOS effectively for file management and system operations.											1	
Create and execute batch files for automating tasks.	2											
Configure system settings using AUTOEXEC.BAT and CONFIG.SYS files.	2											
Define key terms such as data, metadata, database, fields, and records.	3											
Evaluate various types of files and their applications within database management systems (DBMS).					3							
Apply concepts learned to manipulate data using DBASE and explore introductory macro programming techniques.					3							
Define WYSIWYG formatting and utilize features such as spell checking, thesaurus, and mail merging.	3											
Utilize WORDPERFECT V.5 for word processing tasks and desktop publishing.	3											
Demonstrate proficiency in using scanners and laser printers for document creation and production.			2									

Apply programming techniques for numerical calculations, including sorting, searching, and updating data.			2									
Employ Horner's Method for polynomial evaluation and solution of equations.			2									
Utilize numerical methods for tasks such as numerical integration, vector and matrix operations, solving linear equations, and generating graphics.			2								3	2

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
EPP3201: ENTREPRENEURSHIP AND INNOVATION												
Understanding the key concepts and theories of entrepreneurship and innovation	2											
Developing the ability to identify and evaluate potential entrepreneurial opportunities	2				3							
Learning to conduct market research and analysis to assess the viability and potential of a new venture								2				
Gaining knowledge of different forms of business ownership and legal structures and understanding the process of starting and launching a new venture								2				
Developing skills in creating and presenting a business plan or proposal to attract investors or secure financing for a new venture											1	
Understanding the importance of innovation and creativity in entrepreneurial success and learning techniques for generating and developing innovative ideas		3									1	
Gaining knowledge of intellectual property rights and legal issues related to innovation and entrepreneurship											2	
Developing skills in entrepreneurial leadership, including the ability to motivate and empower team members, manage risk, and adapt to changing market conditions											1	
Learning to develop and implement strategies for scaling and growing a new venture, including marketing, operations, and financial management	3											
Understanding the ethical and social responsibilities of entrepreneurs and gaining awareness of sustainability and social impact considerations in entrepreneurial ventures						1						

Level 400

<p align="center">COURSE LEARNING OUTCOMES By the end of the course, students should be able to :</p>	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
EGR4201: ENGINEERING STATISTICS												
Understand the principles and techniques of sampling, including methods for selecting representative samples from populations and the implications of sample size on statistical inference.	1				3							
Analyze data using frequency tables and graphical representations to effectively summarize and visualize distributions of variables, including identifying measures of central tendency and measures of spread.					1							
Calculate and interpret measures of central distribution, such as mean, median, and mode, as well as measures of spread, such as variance and standard deviation, to characterize the variability and distribution of data.	2											
Apply probability theory to analyze the likelihood of outcomes and events, including understanding conditional probability and independence, and interpreting probabilities in real-world contexts.			1									
Define and analyze random variables, including discrete and continuous distributions, and compute expectation and variance to describe the probabilistic behavior of variables.	2											
Explore higher-dimensional random variables, including multinomial and bivariate normal distributions, and understand their applications in modeling complex systems and phenomena.	2											
Analyze relationships between variables using correlation and regression techniques, including interpreting correlation coefficients and regression parameters to quantify and predict relationships between variables.					1							
Understand fundamental concepts in statistical inference, including the law of large numbers and the central limit theorem, and apply sampling and sampling distributions to make inferences about populations based on sample data.	1											

Apply hypothesis testing techniques to make decisions and draw conclusions about population parameters based on sample data, and understand the role of quality control in maintaining and improving processes and products.			2			2					2	
Understand the principles and techniques of sampling, including methods for selecting representative samples from populations and the implications of sample size on statistical inference.	2		2									

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV4201: HIGHWAY ENGINEERING, I												
Demonstrate a comprehensive understanding of highway location principles, including the classification of highways and the design considerations for various types of highways, such as expressways and elevated, ground, and depressed expressways.	2											
Analyze and apply design elements for highways, including weaving ramps, interchanges, and major cross-section elements, considering factors such as speed, sight distance, horizontal and vertical alignment, and intersection design.			1									
Evaluate the economic aspects of highway design, including cost-benefit analysis and considerations of efficiency and sustainability in highway construction and maintenance.								2	3			
Understand the types and structures of pavements, including flexible and rigid pavements, and apply pavement design methods to ensure durability, safety, and longevity of highway surfaces.			2						2			
Develop proficiency in pavement maintenance techniques and the selection of highway construction materials, including asphalt, concrete, aggregates, and additives, to optimize performance and minimize environmental impact		1										

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV4203: SOIL MECHANICS II												
Use appropriate Soil Mechanics techniques for analysing related engineering problems.	2				2							
Work with limited information and extract basic information necessary to solve Soil Mechanics problems.					2			3				2
Analyse soil for civil engineering works that requires compaction.					1							

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV4202: STRUCTURAL ANALYSIS II												
Clearly distinguish between determinate and indeterminate structures and test for same	1											
Analyse and determine load effects of reactions, bending, shear and deflections as well as visualization of these effects using sketches/drawings					1				3			
Describe and analyse beams and trusses under time varying loads	2				2							
Apply energy and virtual work methods in the analyses of indeterminate structures.					2				3			

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV4302: HYDRAULICS/HYDROLOGY												
Understand the fundamental concepts of meteorology, including instrumentation and measurements of physical meteorological parameters such as solar radiation, wind, temperature, sunshine, pressure, rainfall, humidity, weather systems, and climate, with the ability to analyze and interpret meteorological data.	2											
Demonstrate knowledge of the hydrological cycle and water balance equation, including measurement and estimation techniques for components such as precipitation, evapotranspiration, surface runoff, and groundwater, with proficiency in analyzing surface runoff and subsurface flow.	2							2				
Analyze hydrographs, including base flow separation and volume of runoff estimation, and understand the concept of unit hydrograph and rainfall-runoff relationships to predict watershed response to rainfall events effectively.					1							
Apply pipe network analysis techniques such as Hardy Cross method and equivalent pipe concepts, and design pipelines and distribution systems using standard design charts and tables such as Hazen-Williams nomograph, Manning's Charts, and Colebrook-White equation.			2									
Understand the dynamic equations for gradually varied flow and their solutions, analyze flow through hydraulic structures such as spillways, weirs, sluices, and flumes, and explore energy control, wave motion, and flow in non-prismatic channels, with proficiency in analyzing spatially varied flow.	2											
Apply hydraulic model laws and principles to conduct hydraulic simulation and model studies, and utilize model laws in the design of hydraulic structures and systems, demonstrating competence in experimental design and analysis for hydraulic engineering applications.					2				2			2

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV4303: ENGINEERING SURVEYING II												
Understand horizontal alignment principles, including the design and application of simple, compound, reverse, and transition curves in highway engineering.	2											
Demonstrate knowledge of vertical alignment, including summit and sag curves, and their applications in highway design.			2									
Apply methods of setting out curves, including computation of setting-out data, to accurately establish curves in the field for road construction and engineering projects.			2					3				
Utilize photogrammetric techniques in highway and engineering surveying, including aerial photography interpretation and mapping, to accurately assess and analyze terrain and design features.												1
Implement minor and bridge triangulation methods to establish control networks and accurately measure distances and angles for surveying and engineering applications.		2										
Perform hydrographic surveys, including mean sea level and shoreline surveys, to map water bodies and coastal areas, analyze bathymetric data, and support engineering projects such as coastal infrastructure development.			3		2							
Apply theoretical concepts learned in the course to practical laboratory exercises, including setting out curves, drainage, and building layout, as well as minor triangulation, to develop hands-on skills in surveying and engineering practice.				1								2

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV4204: DESIGN OF STRUCTURAL ELEMENTS II												
Describe basic steel properties and structural steel classification for design	1											
Analyse structural steel using elastic and plastic theory of bending					2							
Apply plastic analysis method in determining collapse loads in steel sections			2									
Design steel structural elements and connections under compression, tension, bending and shear			1									
Describe composite sections of steel sections and concrete in buildings	2								2			
Apply knowledge acquired in mini project design of a simple steel structure under vertical loading.		2										

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV4304:CIVIL ENGINEERING PRACTICE												
Understand the nature and types of civil engineering works, including the various forms of contracts used in civil engineering projects and the enforcement of contracts, with knowledge of contract validity and remedies for breach of contract.	2							2				

Analyze and interpret civil engineering contracts, including understanding the types, scope, and contract documents, and applying relevant clauses from civil engineering conditions of contracts to ensure effective contract management.					2		2					
Demonstrate competence in methods of measurement for civil engineering works, including understanding the development of civil engineering codes of measurement, preparing bills of quantities, and implementing charges, pricing, and measurement techniques based on standards like CESMM.	2											
Apply estimation and valuation techniques to civil engineering projects, including estimating and costing for labor, materials, and overheads, valuing interim certificates and final payments, and implementing financial control measures to manage variations and disputes effectively.											1	
Gain practical knowledge of construction machinery and equipment, including their application in various civil engineering projects such as dams, foundations, bridges, highways, industrial buildings, sewage works, and pipeline works, to ensure efficient and effective project execution.	2											2

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
EEP4201: ENTREPRENEURSHIP VENTURE CREATION AND GROWTH												
Ability to identify and evaluate business opportunities based on market research and feasibility analysis	2	2										
Knowledge of the key elements of a business plan and the ability to develop a comprehensive plan for a new venture	1									1	2	
Understanding of different sources of funding for startups and the ability to develop a financing strategy for a new venture												
Familiarity with the legal and regulatory considerations in starting and	2									2		

operating a business													
Ability to develop effective marketing and sales strategies for a new venture									2				
Knowledge of operations management principles and the ability to manage the operations of a startup												2	
Understanding of growth strategies and the ability to develop a scaling plan for a new venture	2												
Ability to analyse and manage the risks and challenges associated with entrepreneurship						2							
Ability to identify and evaluate business opportunities based on market research and feasibility analysis									2		2		
Knowledge of the key elements of a business plan and the ability to develop a comprehensive plan for a new venture		2											
Understanding of different sources of funding for startups and the ability to develop a financing strategy for a new venture	2												
Familiarity with the legal and regulatory considerations in starting and operating a business										1		2	

Level 500

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												
CIV5201: CONSTRUCTION MANAGEMENT AND ECONOMICS												
Demonstrate an understanding of organizational structures, leadership styles, and human resource management principles applicable to construction management contexts, with the ability to effectively manage personnel and teams in construction projects.					2				2			
Apply work study techniques to analyze and improve production processes in construction, including methods analysis, time study,			2									

and productivity improvement methods, to optimize efficiency and effectiveness in project delivery.												
Understand the psychological factors influencing individual and group behavior in construction environments, including motivation, communication, teamwork, and conflict resolution, to enhance organizational effectiveness and employee well-being.		2			2							
Utilize computer applications and software tools relevant to construction management, including project scheduling, cost estimation, resource allocation, and information management systems, to support decision-making and project control processes.											2	2
Apply time and motion study techniques to analyze and optimize work processes, including the use of time-motion analysis, activity sampling, and work sampling methods, to improve productivity and efficiency in construction activities.											1	

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV5202: PUBLIC HEALTH ENGINEERING												
Understand the role of a sanitary engineer in managing water resources, including water use, sanitation, and hygiene practices, and the relationship between water-related diseases and public health.	2											
Analyze the physical, chemical, and biological characteristics of water and wastewater, and develop strategies for water quality assessment and pollution control to ensure safe and sustainable water resources management.					2							
Design and implement water supply systems, including source			1									

identification, treatment processes, and distribution networks, to provide clean and potable water to communities while adhering to relevant standards and regulations.												
Design and manage wastewater collection systems, treatment plants, and disposal methods to effectively treat and manage wastewater, minimizing environmental impact and protecting public health.			1									
Develop comprehensive solid waste management plans, including collection, treatment, and disposal systems, to minimize waste generation, promote recycling and reuse, and ensure environmentally sound waste management practices.		3	2									
Emphasize the use of appropriate technology in water supply, wastewater treatment, and solid waste management, considering factors such as cost-effectiveness, sustainability, and community acceptance.												2
Understand the sources and impacts of air pollution, and develop strategies for air quality monitoring and pollution control to mitigate environmental and health risks associated with air pollution.	2											
COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV5401: CONST. MANAGEMENT AND ECONOMICS II												
Demonstrate competence in material management and purchasing methods, including contract negotiation and procurement strategies, to effectively manage construction resources.			2						2			
Apply economic assessment techniques, including interest formulas, rate of return analysis, and methods of economic valuation, to evaluate construction projects and make informed decisions regarding resource allocation and project selection.					2							

Utilize activity sampling methods and cash flow analysis to optimize resource utilization and assess project performance at various stages of implementation.					2							
Develop skills in project planning and scheduling techniques, including bar charts, network analysis, CPM, and PERT, to effectively plan and manage construction projects, optimize resource allocation, and minimize project duration.			2									1
Apply optimization techniques and linear programming methods to support decision-making processes under uncertainty, utilizing available computer software to aid in project planning and resource management.		2							2			2
Understand the tendering and estimation process within a contractor's organization, including planning, estimation, and decision-making in the tendering process, to prepare competitive bids and secure construction contracts.									1			
Apply principles of post-contract administration and financial management to effectively manage construction contracts, control project costs, and ensure project profitability and success.			2						1			
COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV5402: GEOTECHNICAL ENGINEERING												
Be familiar with the key steps involved in site investigation and understand the applications and limitations of a wide range of methods available for sub-surface profiling as well as acquire the skill of planning and reporting site investigation.	2											
Understand the behaviour of shallow foundations at the brink of failure, solve simple foundation capacity problems using bearing capacity equation and design shallow foundations within a limit-state design framework based on shear strength	1				1				1			

parameters and in-situ test data.												
Understand the principles on which piles behave, their variety and the advantages they offer over shallow foundations as well as analyse their carrying capacity when they are installed as mono-piles or as a group.	2				2							
Analyse the stability of slopes and embankments and have a good grasp of the methods of slope stabilization.					1							
Understand the circumstances where ground improvement is required, to be familiar with various techniques of ground improvement and understand the criteria for selecting suitable method of improvement.			2						2			
COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV5403: WATER RESOURCES ENGINEERING												
Apply statistical and probability methods to analyze hydrological data, including rainfall, streamflow, and groundwater levels, to forecast hydrological events such as floods and droughts, and to optimize reservoir operations for water supply and flood control.			2									
Design efficient and sustainable urban storm drainage systems using hydraulic principles and modeling techniques to mitigate flood risks and manage stormwater runoff in urban areas, considering factors such as land use, rainfall patterns, and climate change impacts.			1						2			
Understand the principles of groundwater flow and aquifer behavior, including groundwater exploration techniques and groundwater modeling, to assess and manage groundwater resources effectively for various purposes such as water supply, irrigation, and environmental protection.	2											

Design functional hydraulic structures, including service and impounding reservoirs, earth dams, rock fill dams, and concrete dams, as well as associated components such as spillways, stilling basins, and outlet works, to ensure the safe and efficient management of water resources and sedimentation control.			2									
Analyze national legislation and policies related to water resources management and apply integrated planning approaches to manage river basins and develop water resources projects, considering economic, social, ecological, and health aspects, and assessing environmental impacts to ensure sustainable water management practices.								1				
COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CIV5404: TRANSPORTATION AND HIGHWAY ENGINEERING												
Understand the interaction between driver behavior, vehicle performance, and road characteristics, including factors such as curvature, superelevation, side friction, and their impact on roadway safety and efficiency.	1								2			
Apply principles of highway design, including design speed, cross-sections, grade alignment, intersections, channelization, and interchanges, to develop safe and efficient roadway configurations that meet traffic demand while considering factors such as capacity, weaving sections, and ramps.			2						2			
Analyze the function and application of traffic control devices, including signals, signs, markings, and channelization devices, to regulate traffic flow and enhance safety on highways and streets in urban areas, including freeway and expressway operations.					1							
Evaluate the design and construction of highway drainage systems, including ditches, culverts, and bridges, to manage	2				1				2			

stormwater runoff and prevent flooding, while considering environmental impacts and sustainability principles in highway construction and maintenance.												
Understand the characteristics of various pavement types, including flexible pavements, bituminous pavements, rigid pavements, and other specialty pavements, and analyze pavement failure mechanisms and methods for pavement improvement and maintenance.								2				

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												
CIV5405: DESIGN OF STRUCTURAL ELEMENTS II												
Apply British and/or Eurocodes as well as any Nigerian/National code in the design of civil-structural infrastructures.	2		2					2				
Quantify and determine live and dead loadings for buildings and other structures					1							
Design different types of slabs to satisfy both serviceability and ultimate limit design states					1			2				
Determine slab load and transfer approaches to beams and columns					1							
Apply analytical skills acquired in the analysis and designs of structural elements in accordance with approved standard.			1						2		3	
Apply knowledge acquired in mini project design of a complex reinforced concrete structure under vertical loading									1			3

COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV5406: STRUCTURAL ANALYSIS III												
Determine vertical and lateral load effects on indeterminate beams and frames					1							
Determine load effects on indeterminate beams using flexibility and stiffness matrix methods		2			1							
Apply numerical methods in analyses of structures			1									
Describe dynamic loadings and analysis of structure under dynamic loadings					2			2	3			
COURSE LEARNING OUTCOMES By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV5301: ADVANCED PUBLIC HEALTH ENGINEERING												
Analyze the composition and characteristics of domestic, industrial, and agricultural wastewaters, as well as natural waters, through advanced laboratory analysis techniques, including measurements of biochemical oxygen demand (BOD), dissolved oxygen (DO), and various contaminants such as metals and non-metals.					2							2
Understand the theories underlying physical, chemical, and biological treatment processes for water and wastewater, including unit operations such as screening, sedimentation, filtration, flocculation, coagulation, precipitation, disinfection, and various biological treatment methods such as aerobic,	1											

anaerobic, oxidation, and facultative processes.												
Design and operate water treatment systems, including processes such as stabilization ponds, trickling filters, and activated sludge systems, as well as wastewater treatment systems, with a focus on achieving effluent quality standards and environmental sustainability.			1					2				
Explore advanced treatment methods for the removal of metals and non-metals from water and wastewater, including nitrogen (NO3), sulfur (SO4), magnesium (Mg), lead (Pb), iron (Fe), calcium (Ca), and others, and understand the principles of water and wastewater treatment model studies.			1					2				
Evaluate strategies for stream pollution control and compliance with effluent standards, including the re-use of effluents, and understand the factors affecting dissolved oxygen (DO) levels and the management of light and heavy pollution in water bodies.					1			2				
Develop comprehensive solid waste management plans, including the collection, treatment, and disposal of solid wastes, with a focus on environmentally sound practices and waste reduction strategies.			2					1				3

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												
CIV5302 - DRAINAGE AND IRRIGATION ENGINEERING												
Understand the physical properties of soil and water, including water retention and movement in soils, and their implications for crop growth and water availability.	1							2				

Analyze crop-water relations, salinity issues, evapotranspiration processes, and crop water requirements to optimize water management practices in agriculture.					1							
Explore concepts of saturated and unsaturated flow, flow equations, and numerical solutions for boundary problems in irrigation and drainage, and their application in water resource management.			3									
Gain basic knowledge of crop classification, environmental crop physiology, and agronomy principles for selected tropical crops, to optimize crop production practices and enhance agricultural productivity.	2							2				
Assess irrigation needs and select appropriate irrigation methods, including furrow, border, ponding, surface, sprinkler, and trickle irrigation systems, and design irrigation systems considering land grading, water requirements, and distribution management.					1				3			
Understand principles of water scheduling, canal design, and hydraulic structure design to effectively manage water resources and optimize irrigation efficiency.	2								2			
Recognize the need for drainage in humid and irrigated lands and apply drainage design theories to design drainage systems.	1							1				
Design and install surface, sub-surface, pipe, mole, and drainage systems, considering drain spacing, depth requirements, and materials, and implement drainage system monitoring and maintenance practices.			1						2			

COURSE LEARNING OUTCOMES												
By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂

CIV5303: ROCK MECHANICS													
Understand the function of rock as foundation.	2												
Appreciate the function of rock as construction material	2												
Analyse and design foundations on rocks					2								
Identify various methods of rock exploration	2		2					2	1				

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
CIV5304- ADV. FOUND. & UNDERGROUND CONSTRUCTION												
Understand the principles and techniques of site preparation, including temporary road construction, site drainage, and preparation of building areas.	2											
Demonstrate proficiency in deep trench and deep basement excavations, bulk excavation, and rock excavation, and assess the stability of slopes for open excavations.			2					3				
Apply methods of support for excavations using timbering and sheet piling, and design retaining walls and sheet piles to ensure structural integrity and safety.			2					3				
Identify the requirements for shoring and underpinning, and apply appropriate methods to provide support and strengthen existing foundations.			3									
Evaluate different shoring and underpinning techniques and select the most suitable methods for specific construction scenarios.	3		3									
Understand the challenges and considerations involved in	3							3				

tunnelling through tough, medium-tough, and soft rocks, and apply appropriate techniques for tunnel construction using borers and shield tunnels.												
Design and construct culverts and conduits for underground water and utility infrastructure, considering factors such as flow capacity, structural integrity, and environmental impact.			1		1							
Design and construct deep foundations, including piles, and perform pile load tests to ensure structural stability and load-bearing capacity.			1		2				3			
Develop foundation designs capable of withstanding dynamic conditions such as seismic loads and other external forces.			1		2				2			

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												
CIV5305 - PRESTRESSED CONCRETE DESIGN												
Describe the basic pre-stressed concrete design philosophy	1		3									
Describe pre-stressing systems and losses in pre-stressing	1				2							
Analyse pre-stress concrete sections under bending, shear, bond and bearing					1							
Evaluate partial pre-stress and non-pre-stress reinforcements					2							
Design pre-stress concrete sections under compression			2									
Apply knowledge acquired in mini project design of a simple pre-stressed concrete structure under vertical loading			2						1	3		

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												
CIV5306 - ANALYSIS AND DESIGN OF TIMBER STRUCTURES												
Describe the basic properties of timber, stress grading and the various defects associated to the materials	2									1		
Describe solid, compound and glulam timber materials	2											
Analyse timber element under flexure, tension, compression and combined loading effects					1							
Apply permissible and limit states principles for design of timber elements under flexure, deflection, shear, bearing and compression conditions.			1									
Design timber connections under varied loading conditions			1						1			

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												
CIV5307 - ADVANCED CONSTRUCTION TECHNOLOGY												
Demonstrate the ability to produce concrete batches, perform mix design calculations, and implement quality control measures	2		1									

to ensure the desired strength, durability, and workability of concrete.												
Understand advanced concrete applications, including concrete pavements, precast concrete, prestressed concrete, mass concrete, and underwater concreting, and apply appropriate techniques for construction in extreme weather conditions.	1								2			
Identify and classify construction plants and equipment, analyze their characteristics and performance, and perform calculations to optimize their utilization and efficiency in construction projects.	2											2
Design and construct elevated structures such as silos, water tanks, and bunkers, including considerations for formwork and scaffolding to ensure safe and efficient construction processes.			1									
Understand the functional requirements of suspended floors, identify different types of suspended floor systems, and apply appropriate construction techniques to meet structural and performance criteria.	2							2		2		
Analyze the functional requirements of roofs, select suitable roof structures based on project needs, and implement various types of roof construction methods to achieve structural integrity and weather resistance.					1							
Construct concrete and metal stairs according to design specifications, considering factors such as safety, accessibility, and structural stability, to provide efficient vertical circulation within buildings.		2							2	2		2

COURSE LEARNING OUTCOMES												
By the end of the course, students should be able to :	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂

CIV5308: RURAL AND URBAN TRANSPORT PLANNING												
Analyze the characteristics of transportation systems, including modes of transport, infrastructure, and networks, and conduct surveys to gather data for analysis and planning purposes.	2				1							
Apply traffic theory principles to understand trip generation, growth, and attraction patterns, and assess highway capacity to optimize traffic flow and mitigate congestion issues.			1						2	2		
Evaluate planning theories and their application in transportation planning, considering factors such as population growth, land use patterns, economic development, and social factors that influence transportation infrastructure and services.	2				2					2		
Understand the principles of environmental planning in transportation systems, including the assessment of environmental impacts, sustainable transportation practices, and strategies for minimizing negative effects on the environment.	1				1							
Analyze the differences between urban and rural traffic patterns, and develop strategies to address unique transportation challenges in both urban and rural areas, including issues related to accessibility, connectivity, and mobility.												
Explore the historical development and current status of transportation systems in Nigeria, and assess future developments and trends to anticipate and address emerging transportation needs and challenges in the country.	2							1		2		

COURSE LEARNING OUTCOMES	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PO₁₁	PO₁₂
By the end of the course, students should be able to :												

CIV5309: ADVANCED TRAFFIC ENGINEERING												
Identify and analyze various elements of traffic, including vehicles, pedestrians, bicycles, and other modes of transportation, to comprehend their interactions and impacts on transportation systems.	1				2							
Differentiate between urban and rural traffic patterns and characteristics, and develop strategies to address unique transportation challenges in both settings, considering factors such as population density, road infrastructure, and land use patterns.	2				2			2				
Apply traffic theory principles to understand traffic flow dynamics, traffic control measures, and factors affecting highway capacity, volume, and level of service, to optimize traffic operations and improve overall transportation efficiency.			1					2				
Gain knowledge of traffic control techniques, including traffic signal control, parking management, and the design and implementation of traffic signs and markings, to ensure safe and efficient movement of vehicles and pedestrians within transportation networks.	1			3								
Understand principles of traffic safety engineering, including crash analysis, hazard identification, and countermeasure implementation, to enhance roadway safety and reduce the incidence and severity of traffic-related accidents.	1									2		

2.6 Introduction

All courses for the first year (Level 100) are taken in the Faculty of Engineering, except the Chemistry and Physics practical which are domiciled in the Faculty of Science. In Levels 100 and 200 all Engineering students in the Faculty take the same courses. In the third year (Level 300) the students are separated so as to take courses in their respective degree programmes.

2.7 Course coding

Each course in the Department is identified by a seven-character code of which the first three characters identify the programme e.g. CIV (for Civil Engineering), EGR (for Faculty of Engineering) and GSP and EPP (for University). The last four characters in a course code are numeric. The first digit designates the level (e.g. '1' for level 100, etc.). The second digit designates the credit hours for the course. The last two digits designate the course number. For example, the code CIV3301 represents a Civil engineering course (CIV) for level 300, with 3 credit hours which is serially numbered as 01.

GSP - Common courses offered to all students in the University

EPP - Common courses offered to all students in the University

2.8 List of Courses

The list of courses from level 100 to 500 are shown in Tables 2.1 - 2.5.

2.8.1 Level 100 Courses

These are offered in the Faculty of Engineering with exception of Chemistry and Physics practical and are common to all students in the Faculty. They are considered to be preparatory courses.

Table 2.1: Level 100 Courses

S/N	Course Code	Course Title	Credit Unit	Pre-requisite
FIRST SEMESTER				
1	CHM1231	Inorganic Chemistry	2	
2	CHM1241	Organic Chemistry	2	
3	CSC1201	Introduction to Computer Science	2	
4	MTH1301	Elementary Mathematics I	3	
5	STA1311	Probability I	3	
6	PHY1170	Physics Practical I	1	
7	PHY1210	Mechanics	2	
8	PHY1220	Electricity and Magnetism	2	
9	GSP1201	Use of English	2	
Total Credits			19	
SECOND SEMESTER				
1	CHM1251	Physical Chemistry	2	
2	CHM1261	Practical Chemistry	2	
3	MTH1302	Elementary Mathematics II	3	
4	MTH1303	Elementary Mathematics III	3	
5	PHY1180	Physics Practical II	1	
6	PHY1230	Behaviour of Matter	2	
7	GSP1202	Use of Library, Study Skills and ICT	2	
Total Credits			15	

2.8.2 Level 200 Courses

All level 200 courses are offered in the Faculty except the GSP which are University courses and are common to all the programmes in the Faculty.

Table 2.2: Level 200 Courses

S/N	Course Code	Course Title	Credit Unit	Pre-requisite
FIRST SEMESTER				
1	EGR2204	Workshop Practice	2	
2	EGR2205	Thermodynamics I	2	
3	EGR2206	Material Science I	2	
4	EGR2207	Principles of Electrical Engineering I	2	PHY1220
5	EGR2301	Engineering Mathematics I	3	MTH1301
6	EGR2304	Laboratory A	3	
7	EGR2306	Applied Mechanics	3	
8	*GSP2201	Use of English	2	

9	GSP2204	Foundation of Nigerian Culture, Government and Economy	2	
10	GSP2206	Peace Studies and Conflict Resolution	2	
Total Credits			21/*23	
1	EGR2101	Engineer in Society I	1	
2	EGR2102	SWEP	1	
3	EGR2103	Experimental Methods and Analysis	1	
4	EGR2201	Fluid Mechanics I	2	
5	EGR2202	Solid Mechanics I	2	
6	EGR2203	Engineering Drawing I	2	
7	EGR2208	Principles of Electrical Engineering II	2	
8	EGR2302	Engineering Mathematics II	3	
9	EGR2305	Laboratory B	3	
10	EGR2313	Computer Programming	3	CSC1201
11	*GSP2202	Use of Library, Study Skills and ICT	2	
12	GSP2205	Logic and Philosophy	2	
Total Credits			22/*24	

*For Direct Entry Students only

2.8.3 Level 300 Courses

Table 2.3: Level 300 Courses

S/N	Course Code	Course Title	Credit Unit	Pre-requisite
FIRST SEMESTER				
1	CIV3303	Fluid Mechanics II	3	EGR2201
2	CIV3304	Soil Mechanics	3	
3	CIV3305	Laboratory Practical A	3	
4	CIV3308	Strength of Materials	3	EGR2202
5	CIV3309	Structural Analysis I	3	
6	CIV3401	Engineering Geology	4	
7	CIV3403	Engineering Survey I	4	
8	EGR3101	Engineer in Society II	1	
9	EGR3301	Engineering Mathematic III	3	EGR2301
Total Credits			27	

SECOND SEMESTER				
10	CIV3301	Civil Engineering Practice	3	
12	CIV3302	Civil Engineering Materials	3	EGR2206
13	CIV3306	Laboratory Practical B	3	

14	CIV3307	Design of Structural Element I	3	
15	CIV3402	Civil Engineering Drawing	4	EGR2203
16	EGR3102	Technical Writing and Presentation	1	
17	EGR3203	SIWES I	2	
18	EGR3302	Computation Techniques	3	EGR2302
19	EGR3311	Computer Application	3	EGR2313
20	EEP3201	Entrepreneurship and Innovation	2	
Total Credits			27	

2.8.4 Level 400 Courses

Table 2.4: Level 400 Courses

S/N	Course Code	Course Title	Credit Unit	Pre-requisite
FIRST SEMESTER				
1	CIV4201	Highway Engineering I	2	CIV3403
2	CIV4202	Structural Analysis II	2	CIV3309 & EGR3301
3	CIV4203	Soil Mechanics II	2	CIV3304
4	CIV4204	Design of Structural Element II	2	CIV3307
5	CIV4301	Laboratory Practical	3	
6	CIV4302	Hydraulics/Hydrology	3	CIV3303
7	CIV4303	Engineering Surveying II	3	CIV3403
8	CIV4304	Civil Engineering Practice	3	
9	EGR4201	Engineering Statistics	2	
10	EPP4201	Venture Creation and Growth	2	
Total Credits			24	
SECOND SEMESTER				
11	EGR4401	SIWES II	4	
Total Credits			4	

2.8.5 Level 500 Courses

Table 2.5 (a): Level 500 Courses (Core Courses)

S/N	Course Code	Course Title	Credit Unit	Pre-requisite
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FIRST SEMESTER				
1	CIV5202	Public Health Engineering	2	
2	CIV5310	Laboratory Practical A	3	
3	CIV5401	Construction Management and Economics II	4	CIV4304
4	CIV5404	Transportation and Highway Engineering	4	CIV4201
5	CIV5406	Structural Analysis III	4	CIV4202 & EGR3302
6	Plus 3 credits option course		3	
Total Credits			20	
SECOND SEMESTER				
7	CIV5201	Construction Management and Economics I	2	
8	CIV5311	Laboratory Practical B	3	
9	CIV5402	Geotechnical Engineering	4	CIV4203
10	CIV5403	Water Resources Engineering	4	EGR4201
11	CIV5405	Design of Structural Elements III	4	CIV4204
12	CIV5601	Final Year Project	6	
13	Plus 3 credits option course		3	
Total Credits			26	

Table 2.5 (b): Level 500 Courses (Option Courses)

S/N	Course Code	Course Title	Credit Units
1. Water Resources and Environmental Engineering			
1	CIV5301	Advanced Public Health Engineering	3
2	CIV5302	Drainage and Irrigation Engineering	3
TOTAL CREDITS			6
2. Geotechnical Engineering			
3	CIV5303	Rock Mechanics	3
4	CIV5304	Advanced Foundation & Underground Construction	3
TOTAL CREDITS			6
3. Structural Engineering			
5	CIV5305	Prestressed Concrete Design	3
6	CIV5306	Analysis and Design of Timber Structures	3
TOTAL CREDITS			6
4. Building/Construction Technology			
7	CIV5304	Advanced Foundation & Underground Construction	3
8	CIV5307	Advanced Construction Technology	3

TOTAL CREDITS			6
5. Transportation Engineering			
9	CIV5308	Rural and Urban Transportation Engineering	3
10	CIV5309	Advanced Traffic Engineering	3
TOTAL CREDITS			6

Note: Option courses are offered in 5 areas and a student is expected to choose from any of the areas of specialization.

2.8.6 Summary of credit unit per level requirements for Civil Engineering

2.8.6.1.1 Level	First Semester	Second Semester	Total
100	19	15	34
200	21/23*	22/ 24*	43/47*
300	27	27	54
400	24	4	28
500	20	26	46
Total			205/175*

*For Direct Entry (DE) students

2.9 Description of Courses

2.9.1 Level 100 Courses

CHM1230: Inorganic Chemistry (2 Credits)

Principles of atomic structure, isotopes, empirical and molecular formulae. Electronic configuration, periodicity and building up of the periodic Table. Hybridization and shapes of simple molecules. Extraction of metals. Comparative chemistry of groups IA, IIA and IVA elements. Preparation, properties, structure and application of some of the selected compounds. Introduction to transition metal chemistry and nuclear chemistry.

CHM 1240: Organic Chemistry (2 Credits)

Historical survey of the development and importance of organic chemistry; IUPAC Nomenclature and classification of organic

compounds; homologous series; Covalent bonds and hybridization to reflect the tetravalency of carbon in Organic compounds, electronic theory in Organic chemistry. Qualitative and quantitative Organic chemistry, Determination of empirical and molecular formulas; isolation and purification of Organic compounds; saturated hydrocarbons; structural isomerism, properties and reactions of alkanes and cycloalkanes, mention of their chemistry and uses in petroleum; unsaturated hydrocarbons; alkenes; alkynes, cycloalkenes; cis-trans isomerism, simple electrophilic addition reactions, polymerization.

CHM 1250: Physical Chemistry (2 Credits)

Principles of atomic structure; Isotopes, empirical and formulae, Nuclear structure, atomic fission and nuclear energy. The electronic structure and arrangement of electrons in atoms. Electronic configuration 1st and 2nd rows of elements. Properties of gases: equation of state, kinetic and molecular theory of gas and Heat capacities of a gas. Equilibrium and Thermodynamics; Thermo-Chemistry, Enthalpy of reactions, bond energies, thermodynamic cycles, Hess's law Born Herber cycle, the meaning of K_a , K and K LeChatelier's principle pH, ionic equilibrium, buffers, indicators, solubility product, common ion effect, redox reactions. Electrode potentials, electrolytes and electrolysis. Kinetics: the positions of equilibrium and the rate at which it is attained. Factors influencing rate of reactions. Introduction to activation and catalysis.

CHM 1270: Practical Chemistry (2 Credits)

Laboratory instruction and Experimental products shall be conducted for the candidates from the following subject areas:

Physical: Determination of heats of reaction, effect of solute on boiling point of solvents, partition coefficient. Determination of molecular mass by Dumas and Victor Meyer methods. Measurements of rate equation and Activation energy. Other experiments based on the scope of the lectures and as approved by the Department.

Organic: Safety precaution instructions, classification of Organic compounds by their solubility's in common solvents. Qualitative analysis for common elements in Organic compounds. Identification and classification of acids and bases functional groups. Identification of the following: natural function groups; alcohols, aldehydes, ketons, esters, anhydrides and ethers. Acetylation of aniline as an example of the preparation of solid aniline derivative. An electrophilic addition reaction.

Inorganic: Qualitative and quantitative analysis, molarity, concentration and percentage purity.

CSC1201: Introductory Computer Science (2 Credits)

History of computers, functional components of computer, characteristics of a computer, problem solving; flow charts, Algorithms. Computer programming. Statements, symbolic names; arrays, subscripts, expressions and control statements. Introduction to **BASIC OR FORTRAN** programming language, computer applications.

MTH1301: Elementary Mathematics I [Algebra & Trigonometry] (3 Credits)

Elementary set theory: subsets, union, intersection, complements, Venn diagram; Real numbers: algebra of the complex irrational numbers; complex numbers algebra of the complex numbers, the Argand diagram, De Moivre's theorem, n-th roots; mathematical Induction; real sequences and series; theory of quadratic equations; binomial theorem; circular measure; trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH1302 Elementary Mathematics II [Vectors, Geometry & Dynamics] (3 Credits)

Geometric representation of vectors in 1,2, and 3 dimensions, components, direction cosines, addition, scalar multiplication of vectors, linear independence. Scalar and vector product of vectors. Differentiation and integration of vector functions with respect to scalar variables. Two dimensional co-ordinate geometry: straight lines, circles, parabola, ellipse, hyperbola, tangents, normal. Kinematics of a particle: component of velocity and acceleration of a moving particle in a plane. Force momentum, laws of motion under gravity, projectiles, resisted vertical motion, elastic string, simple pendulum impulse. Impact of two smooth spheres, and of a sphere on a smooth surface.

MTH1303: Elementary Mathematics III [calculus 1] (3 Credits)

Function of real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching; integration as an inverse of differential. Methods of integration, Definite integrals. Application to areas, and volumes.

PHY1210: Mechanics (2 Credits)

Space and time, frames of reference, units and dimension, kinematics; fundamental laws of mechanics Statics and dynamics; Galilean invariance; universal gravitation; work and energy; rotational dynamics and angular moment; conservation laws.

PHY1220: Electricity and Magnetism (2 Credits)

Electrostatics; conductors and currents; dielectrics; magnetic fields and induction; Maxwell's equations; electromagnetic oscillations and waves; applications;

PHY1230: Behaviour of matter (2 Credits)

Molecular treatment of properties of matter elasticity; Hooke's law; young's shear and bulk moduli. Hydrodynamics; streamlines, Bernoulli and continuity equations, turbulence, streamlines, Bernoulli and continuity equations, turbulence; Reynold's number. Viscosity; laminar flow, Poiseuille's equation. Surface tension; adhesion, cohesion, capillarity, drops and bubbles, Temperature; the zeroth law of thermodynamics; heat; gas law; laws of thermodynamics; kinetic theory of gases. Applications.

PHY1170/1180: Physics Practical I/II (1 Credit)

This introductory course emphasizes quantitative measurements, the treatment of measurement errors, and graphical analysis. A variety of experimental techniques will be employed. The experiments include studies of meters, the oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity, etc. covered in the above physics courses.

STA1311: Probability I (3 Credits)

Generation of statistical events from set-theory and combinatorial methods. Elementary principles of probability. Types and distribution of random variables; the binomial, Poisson, hypergeometric and normal distributions. Expectations and moment, random variables; probability sampling from table of random numbers; selected applications.

GSP1201/2201: Use of English (2 Credits)

GSP1202/2202: Use of Library, Study Skills and ICT (2 Credits)

2.9.2 LEVEL 200 COURSES

EGR2101: Engineer in society I (1 Credits)

Technology in society: Historical development of modern societies. The growth and efforts of technology including the industrial revolution and the harnessing and exploitation of various energy sources. The role and responsibilities of engineers in society.

The Engineering Profession: The evolution of the different branches of engineering. The structure, organization and ethics of the profession. The specific responsibilities of society of the Civil Engineer, the Electrical Engineer and the Mechanical Engineer. Other engineering disciplines and their relationships; Multidisciplinary projects. The contrast between the Engineer and the scientist and the engineering approach to the solution of practical problems. Education and Training of professional Engineers. Professional Institutions.

Engineering Projects: The role of engineering activities and industry in the nation's economy. Introduction to economics, management and law as relating to engineering practice. The planning, construction and operation of engineering projects and facilities.

Research: The role of research in Engineering. Sources of research financing and funding. Objectives of engineering research. The role and function of research and development (R & D). Departments in industries.

NOTES: Seminars by practicing engineers as well as films on engineering will comprise part of the above lecture course, which will also be supplemented by visits to illustrate the major branches of engineering as far as local opportunities allow.

EGR2103: Experimental Methods and Analysis (2 Credits)

Analysis: Principles of measurement, standard deviation, Method of least squares and its application. Curve fitting, Theory of errors. Binominal and other distributions, Goodness of fit, Chi-squared test.
Experimental Methods: Experimental Methods Displacement and strain measurement. Force and torque measurement. Temperature measurement. First and second order systems. Dynamic response.

EGR2201: Fluid Mechanics I (2 Credits)

Properties of Fluids: Characteristics of liquids, gases and the “ideal” fluid; viscosity; compressibility; surface tension and capillarity; vapour pressure and solubility of gases. Dimensions and units.

Static Fluids: Intensity of pressure and hydrostatic equation: absolute pressure and gauge pressure; measurement of pressure. Forces due to hydrostatic pressure on plane and non-plane surfaces; forces on floating and immersed objects; stability and metacentric height.

Fluids in Motion: Definitions: steady, unsteady, uniform and non-uniform flow; velocity distribution and discharge; the concepts of a fluid particle, streamlines and stream tubes, the continuity (conservation of mass) equation. The energy (Bernoulli’s) equation for incompressible steady flow: applications to orifices, nozzles, venture meters, pitot tubes, notches and weirs time of emptying tanks.

Fluid Friction: Laminar and turbulent flow, and the experiments of Reynolds. Head loss due to friction in pipes and closed conduits: The Darcy equation and the concept of hydraulic gradient: other losses in pipes appurtenances. Introduction of flow in open channels: The Chezy formula.

EGR2202: Solid Mechanics I (2 Credits)

Fundamental of equilibrium. Statical determinacy with reference to pin-jointed frames. Forces analysis of pin-jointed plane and space frames. Shear force and bending moment. Shear force and bending moment diagrams. Relations between load, shear and bending moment. Normal stress and strain. The stress strain relationship. Poission's ratio. Thin cylinders and spheres. Shear stress. Complementary shear stress. Shear strain. Torsion of shafts of circular section. Bending theory. Deflection of beams. Macaulay's method. The moment-area method. Simple applications of strain energy to single load systems. Close-coiled helical springs.

EGR2203: Engineering Drawing I

(2

Credits)

Introduction: the importance of drawing in the engineering process. Standards, units and paper sizes; equipment and drawing instruments; scales, lettering and dimensioning; good draughtsman ship and drawing procedure. Representation of three- dimensional objects: freehand sketching; first and third angle orthographic projections; isometric drawing and projectional representation of hidden detail and sections. Construction and dimensioning of circles and arcs; obliques [cavalier and cainet] drawing; axonometric and perspective projections.

Engineering practice: introduction to the various branches of engineering drawing common engineering terms, conventions, abbreviations and symbols; electrical engineering symbols and circuit diagrams.

EGR2204: Workshop practice

(2 Credits)

Lectures: Workshop Hazards; Hand processes and bench work; joining and fastening; welding; Hand tools; Measurement Systems and devices; Marking out; sheet metal work; Basic carpentry and joinery; Electrical tools and usage; simple Electrical installation; Cement and concrete preparation; Concrete block making;

shuttering and concrete casting; wall building; Introduction to machine tools.

Practicals: Marking out and fitting exercise; Manufacture of a simple bolt; construction of a simple amplifier; Exercise in battery maintenance and charging; Cement and concrete preparation and laying. Block making; Column casting; Block and brick wall building.

EGR2205: Thermodynamics (2 Credits)

Fundamental Concepts: Introduction to Thermodynamics. The System. Thermodynamic properties. Heat and work. Energy resources. Heat sources and heat sinks. The First Law of Thermodynamics: The cycle. The statement of the first law of thermodynamic. Corollaries of the first law. The non-flow energy equation application of the I to various processes. The Steady Flow Energy Equation: The derivation of the steady flow energy equation from the first Law. Simple applications of the steady flow energy equations. The Second Law of Thermodynamics: Cycle efficiency: Definition of a heat engine. Statements of the Second Law of Thermodynamics. Reversibility. Carnot cycle and other cycles. Corollaries of the Second Law. Properties of Substances: Definition of a pure substance. Phase changes. Relationship between properties. The perfect gas and the semi perfect.

GSP2201: Use of English (2 Credits)

GSP2202: Use of Library, Study Skills and ICT (2 Credits)

Note: GSP2201/2202 are only offered to DE students

2.9.3 LEVEL 300 COURSES

CIV3301: PRINCIPLES OF CONSTRUCTION (3 Credits)

PART A - Introduction to Civil Engineering Procedure

Definition and functions of the Civil Engineering profession. The design and construction teams. Introduction to the Principles of Civil

Engineering design. Influence of erection procedure on design.
Operation and maintenance of Civil Engineering facilities.

PART B - General Considerations in Civil Engineering Works; Site investigation; Site organisation; Temporary works; Earth works; Construction machinery and Equipment.

PART C - Elements of Construction; Domestic, industrial and multi-storey buildings; Construction of foundations, floors, walls, staircases, roofs and coverings; Frame and space construction; fire protection. Elements of grid construction; Road works, Subways, Railways, Air fields, Hydraulic and Liquid retaining structures, Dams, Harbours, Docks, Jetties etc.; Dredging and reclamation; Irrigation and River works; Pipelines for water, gas and sewage; Concept of appropriate technology in Civil Engineering.

CIV3302: CIVIL ENGINEERING MATERIALS (3 Credits)

Cement: Cement manufacture, properties, types and uses, products; **Aggregates:** sources, types, properties and uses; **Admixtures:** sources, types, properties and uses;

Concrete: Lightweight concrete, Fibre reinforced concrete; Reinforced cement concrete; Pre-stressed concrete; Properties of fresh concrete; Properties of hardened concrete; Strength and failure criteria; Non-destructive testing; Creep and shrinkage; Design of concrete mixes; Quality control; Formwork, Finishes and Durability.

Ceramic materials: Clay products, glasses, bricks, manufacture and properties.

Polymer materials: Classification of polymers. Manufacture, physical and mechanical properties. Application of polymers in civil engineering works; pipe work, bridge bearing, fluid sealing, vibration isolation, reinforced plastics. Rubbers.

Bituminous Materials: Bituminous binders. Manufacture, properties and uses. Viscometers. Penetration index. Bitumen and Asphalt

mixes. Workability, strength and durability. Specifications and standard tests. Bituminous material for roads, hydraulic works and flats roofs.

Steel Technology: Production, fabrication and properties of steel. Types, Corrosion of steel and its prevention. Tests on steel and quality control measures.

CIV3303: FLUID MECHANICS II (3 Credits)

The momentum equation and forces due to fluid in motion. Application of momentum equation in solution of pipeline problems e.g. force due to change in direction, size etc., thrust blocks, anchorages etc., and open channels. Introduction to boundary layer theory, formation and separation of eddies, skin friction and drag; Dimensional Analysis: Derivation of relationships involving different fluid flow problems using Mathematical models: Raleigh method, Buckingham PI theorems; Applications of dimensional analysis; Hydraulic Machinery; Turbines: Peltot, wheel, Francis, axial flow. Characteristics of turbines, velocity diagrams, power developed, efficiencies. Draft tubes and diffusers. Pumps: Characteristics of reciprocating and rotodynamic pumps, specific speed efficiencies, power, etc.; Flow in Open Channels: Non-uniform flow and unsteady flow in channels e.g. rivers, canals, drainage channels, etc. Design of channels: erodible and non-erodible channels

C1V3304: SOIL MECHANICS I (3 Credits)

Classification and properties of engineering soils (Grain size analysis and Atterberg limits); Phase relationships - void ratio, porosity, specific gravity, density and unit weight; Seepage, permeability and groundwater flow; flow nets, Shear strength of soils - the Mohr-Coulomb failure criterion, shear strength tests; Elements of stress analysis (principles of effective stress, stresses at a point in a soil mass, stresses due to self-weight and stresses due, to applied loads; Stresses and Displacements - Influence charts, displacements from the theory.

CIV3307: DESIGN OF STRUCTURAL ELEMENT I(3 Credits)

Introduction to reinforced concrete design, Design theories and materials, Analysis of frames for vertical loads; Analysis of frames for horizontal and vertical loads, Analysis of sections in bending; Shear, Bond and Torsion, Deflection and cracking.

CIV3308:1 STRENGTH OF MATERIALS (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. Applications strain energy, Biaxial and state of stress, Transformations of stresses. Mohr's circles, Springs, Creep, fatigue, fracture and stress concentration, Betti and Maxwell's theorems, and Castigliano's theorem.

CIV3309: STRUCTURAL ANALYSIS I (3 Credits)

Determinate structures: Simple beam analysis, Bending moment, axial force and shear force diagram. Graphical methods of determining reaction forces and resultant force. Determination of section properties. Analysis of simple frames and arches.

CIV3401: ENGINEERING GEOLOGY (4 Credits)

Relevance and importance of Engineering Geology to Civil Engineers, Geology, surface and structure of the earth, Surface processes (weathering, erosion, transportation, deposition and formation of soils). Mineralogy - study of types, character and properties of minerals, Petrography - study of types, character and properties of rocks, Geological structures and mapping, Geophysical techniques, Stratigraphy - time scale, fossils and their importance with special reference to Nigeria. Introduction to the geology of Nigeria. Engineering applications to design and construction of engineering works such as dams, tunnels, excavations, stability of slopes, and occurrence of groundwater.

CIV3402: CIVIL ENGINEERING DRAWING (4 Credits)

Geometrical Drawing: The vertical and the horizontal plane, representation of a point and line, determination of the true length of a line, representation of a solid, auxiliary projection of conic sections and common curves; Elements of Architecture: Dimensional awareness, graphic communication and relation to environment. Free hand drawing, form in terms of shade, light and shadows. Orthographic diametric, perspective projections; Building drawings: Block plan, site plan, floor plans, elevations, cross-sections, typical details. Study of specific examples; Structural drawings (steel structures): Representation of steel sections, rivets and bolted connections, welded joints, butt and fillet welds, beam-beam and column-beam connections splicing and column bases; Structural drawings (reinforced cement concrete structures): Introduction to reinforcement bars, end anchorages of reinforcement, U and L hooks, notation and identification of bars on drawings. Detailed reinforcement drawings, sectional views of members and bar scheduling. Specific cases of beams, one-way slabs two-way slabs, columns, staircase, footings and foundation details; Presentation of Road designs and other Civil Engineering Drawings: Layout plans showing proposed road, existing structures; horizontal alignment of the proposed road, drains, location of bridges and railway crossings, horizontal curves; longitudinal section showing datum, the existing ground level, proposed longitudinal profile of the road, vertical curves, drainages, the proposed invert levels of drains and culverts. Cross-sections consisting of the extent of the road reserve, the road pavement, (showing base subgrade, base course and wearing course), drains and culverts, cross-slope and super-elevation: contours, representation of earthwork, cut and fills. Retaining walls; design and uses; Methods of Support (Bearings): Journal, Roller and Ball Bearings - technical representation; Presentation of Water Resources/Environmental Engineering Structures: Sections of earth, gravity, arch-dams; reservoirs, water tanks, pipe-layouts, manholes, septic tank and soakaway pit, sewers.

CIV3403: ENGINEERING SURVEYING I**(4 Credits)**

Introduction to Surveying Instruments; Types, Adjustments and Uses; Theory of Errors; Types, Detection and elimination; Chain Surveying; Compass Surveying; Plan Table Surveying; Levelling: Tacheometric, Trigonometric, Altimetric, Geometric; Theodolite Traversing.

2.9.4 LEVEL 400 COURSES**EGR4301: ENGINEERING STATISTIC**

Sampling, frequency tables and their graphs, centre of distribution, spread of distribution, outcomes and their probabilities, conditional probability. Independence and standard deviation. Random variables, Expectation, variance, specific discrete and continuous distributions. Higher dimensional random variables. Multinomial and Bivariate normal probability distributions. Correlation and regression. Law of large numbers and central limit theorem. Sampling and sampling distributions. Test hypothesis and quality control.

CIV4201: HIGHWAY ENGINEERING

Highway Location: Classification of highways, Expressways. Design elements; elevated, ground, depressed expressways, weaving ramps; Interchanges: Types, design considerations; Highway economics: Highway Design Elements: Speed, sight distance, horizontal alignment, vertical alignment. Major cross section elements, other intersection elements; Pavements: Types of pavements: flexible pavements, rigid pavements. Structure of pavements. Pavement design methods. Pavement maintenance, highway construction materials.

CIV4202: STRUCTURAL ANALYSIS II

Indeterminate Structures: Differences between determinate and indeterminate structures. The test for statical indeterminacy for plane structures. Unstable plane structures. The three moment

equation. The method of cross. The use of Mohr's theorems. Deflection caused by temperature changes. Deflections and general expression for flexibility coefficients. Deflection curves for beams and frames. The Williot-Mohr diagram for truss deflections. Analysis of fixed beams. Beams of variable cross sections. The slope deflection equations. Moment-area method; influence lines.

CIV4203: SOIL MECHANICS II

Consolidation theory: consolidation test, compressibility characteristics, coefficient of consolidation; Settlement analysis: settlement of a foundation, immediate settlement, consolidation settlement, stress path; Compaction and Soil Mechanics aspects of highway design; Lateral Earth Pressure and Retaining walls (Rankine and Coulomb's theory, graphical methods).

CIV4204: DESIGN OF STRUCTURAL ELEMENTS II

Introduction to Structural Steel Design: Properties of steel, Tension members; Beams in bending and shear; Deflections; Bearing places for beams; Compression members. Stanchion and column bases; Connections; Composite construction; The continuous beam; Design projects.

CIV4304: CIVIL ENGINEERING PRACTICE

Civil Engineering Contracts: Nature and types of civil Engineering works. The nature and form of contracts. Enforcement of contracts. Validity of contract and remedies for Breach of Contract. Civil Engineering Contracts: Types and scope. Contract Documents including reference to appropriate clauses in Civil Engineering conditions of contracts; Civil Engineering Works and Methods of Measurements: Introduction to the development of Civil Engineering codes of measurement, scope of Civil Engineering works, comparison of Civil Engineering and building methods of measurement. General

arrangements and contents of Civil Engineering Bills of Quantities. Method related to charges, pricing and measurement of Civil Engineering work including reference to relevant clauses in the CESMM, Preparation of Bills of Quantities. Specification writing; Estimation and Valuation: Estimating and costing of Civil Engineering works: Fixed method and time related costs. Estimating for labour, plant materials and overheads. Valuation for interim certificates and final payments. Introduction to financial control of construction works. Variation and disputes; Construction Machinery and Equipment: Application of various techniques to live Civil Engineering projects: Dams, foundations, bridges, highways, industrial buildings, sewage works, pipeline works, etc.

CIV4302: HYDRAULICS/HYDROLOGY

Meteorology: The basic concepts, instrumentation and measurements of physical meteorological parameters viz solar radiation, wind, temperature, sunshine, pressure, rainfall, humidity, weather systems and climate; Hydrology: The hydrological cycle and the water balance equation. Measurement and or estimation of the various components in the cycle i.e. precipitation evapotranspiration, surface runoff, groundwater etc. Surface runoff and subsurface flow; Hydrography Analysis: Components of hydrograph, base flow separation volume of runoff estimation. Concept of unit hydrograph. Rainfall - runoff relationships. Flow in pipes: Pipe network analysis e.g. Hardy Cross. Equivalent pipe, Electric analogue etc. Hydraulic design of pipelines and distribution system, the use of standard design charts and tables e.g Hazen-Williams nomograph, Manning's Charts, Colebrook White etc. Compressible Flow: The dynamic equations for gradually varied flow and their solution for some common problems. Analysis for flow through hydraulic structures: spillways, weirs, sluices flumes. Energy control wave motion and flow in non-prismatic channels, spatially varied flow. Analysis of Experiments: Hydraulic model laws,

hydraulic simulation and model studies. Application of models laws to design a hydraulic structures and system.

CIV4303: ENGINEERING SURVEYING II

Geometric: Horizontal Alignment: Simple Curves, Compound Curves, Reverse Curves, Transition Curves. Vertical Alignment: Summit Curves, Sag Curves. Setting-Out Curves: Methods of setting out, Computation of Setting-out data; Photogrammetry in Highway and Engineering Surveying: Triangulation, Minor triangulation, Bridge triangulation; Hydrographic Surveying: Mean sea level, Shore line surveys.

2.9.5 LEVEL 500 COURSES

CIV5201: CONSTRUCTION MANAGEMENT AND ECONOMICS

Organisational /Personnel Management, Work study and production processes; Industrial psychology; Application of computers in Construction Management; Techniques of time and motion studies.

CIV5202: PUBLIC HEALTH ENGINEERING

The work of the Sanitary Engineer, water use and water related diseases. Physical, chemical and biological characteristics of water and wastewater quality and pollution control. Water supply, treatment and design. Wastewater collection treatment, disposal and design. Solid waste collection treatment, disposal and design of systems. Appropriate technology of water supply, wastewater treatment, etc., should be highly emphasised. Air pollution and control.

CIV5401: CONSTRUCTION MANAGEMENT AND ECONOMICS II

The Management of Environment, Resources Management and Economic Assessments: Material management; purchasing methods. Contracts. Interests formula. Rate of return. Methods of economic valuation. Selection between alternatives. Activity sampling. Cash

flow and interim valuations; Site Management and Construction Planning: Project planning and scheduling techniques; bar chart, network analysis; CPM (Critical Path Method); PERT (Project Evaluation and Resources Techniques). Optimisation. Linear Programming as aid to decision-making policies under risk and uncertainties including the use of available computer software; Tendering Evaluation and Contract Administration: The estimating and tendering process within a contractor's organisation. Planning and estimation. The calculations and decisions in tendering. Post contract administration. Financial management.

CIV5402: GEOTECHNICAL ENGINEERING

Types of foundation, Stability of foundations, Bearing capacity of shallow and deep foundation. Stability of slopes (infinite slopes, cuttings, embankment and earth dam stability). Site investigation methods. Methods of ground improvement Identification, classification and geotechnical properties of tropical soils (special preferences to Nigeria).

CIV5403: WATER RESOURCES ENGINEERING

Statistics and probability methods in hydrology: Hydrological forecasting reservoir and flood routing. Design of urban storm drainage. Groundwater hydraulics and groundwater exploration; Hydraulics Structures: Functional design of service and impounding reservoirs. Sedimentation control in reservoirs. The design of earth dams, rock fill dams, concrete dams and associated components, e.g. spillways, stilling basins, outlet works, sluice ways, etc; Water Resources Management: National legislation in water resources. Integrated planning of river basins, economic analysis of water resources projects. Environmental impact of water resources projects: Social, ecological, health aspects.

CIV5404: TRANSPORTATION AND HIGHWAY ENGINEERING

Driver vehicle and road characteristics. Curvature, super elevation and side friction. Speed-volume relationships. Factors that reduce capacity. Capacity of intersections with traffic signal control. Capacity of other kinds of intersections. Capacity of interchanges. Weaving sections. Ramps and their terminals. Highway design, Highway standards design speed, design of cross-sections. Design of grade alignment design. Design of intersections at grade. Channelisation, rotary intersections. Interchange, types and characteristics. Traffic control devices. Freeway and expressway operations. Operation in highways and streets in urban areas. Parking and rest areas. Highway drainage ditches, culverts, bridges, highways and the environment. Highway construction materials. Flexible pavements. Bituminous pavements. Rigid pavements, other types of pavements. Failure of pavement and detailed methods of improvement of defects.

CIV5405: DESIGN OF STRUCTURAL ELEMENTS II

Design of Reinforced Concrete Structures: Design of Beam; Design of slabs and stairs; Design of columns and walls; Design of foundations and retaining walls; Design projects.

CIV5406: STRUCTURAL ANALYSIS III

Indeterminate Structures: Energy and virtual work method, flexibility method, the method of kani (including side sway of frames), moment distribution (Hardy cross methods), matrix formulation of the stiffness method. Influence lines; Yield line analysis and strip methods for slabs; Introduction to simple plastic theory of bending, collapsed loads. Introduction to structural dynamics.

CIV5301: ADVANCED PUBLIC HEALTH ENGINEERING

Introduction: The composition and characteristics of domestic, industrial and agricultural wastewaters and natural waters; advanced laboratory analysis - BOD, DO, metals, non-metals, etc. Water and Wastewater Systems: Theories behind the physical, chemical and biological treatment processes. Unit operations, processes and design: Physical screening, sedimentation, filtration, chemical flocculation, coagulation, precipitation, disinfections, etc. biological - aerobic, anaerobic, oxidation and facultative. Water treatment system: Wastewater treatment systems, stabilisation ponds, trickling filters, activated sludge. Introduction to tertiary treatment: Removal of metals and non-metals NO_3 , SO_4 , Mg, Pb, Fe, Ca, etc. water and wastewater treatment model studies. Stream pollution control and effluent standard; effluent re-use; DO, light and heavy pollution. Management of solid wastes; collection, treatment and disposal systems.

CIV5302 - DRAINAGE AND IRRIGATION ENGINEERING

Soil-Plant-Water Relations: Physical properties of soil and water; water retention and availability in soils; soil water movement; crop-water relations; salinity; evapotranspiration and crop water requirements. Saturated and unsaturated flow; flow equation and numerical solution of boundary problems in irrigation and drainage; Crop Production: Basic introduction to crop classification; environmental crop physiology and crop agronomy of selected tropical crops; Irrigation: Irrigation need; irrigation methods - furrow, border, ponding, etc; design of surface, sprinkler and trickle irrigation systems; land grading on farm and scheme water requirements; scheduling and managing the distribution of water; design of canals and hydraulic structures. Drainage: Drainage need for both humid and irrigated land; drainage design theories; drain spacing and depth requirements for humid, humid-irrigated and dry irrigated areas; methods and materials; system monitoring,

problem soils. Design and installation of surface, sub-surface, pipe and mole and drainage systems; drain maintenance.

CIV5303: ROCK MECHANICS

Rock as a foundation and constructional materials, engineering properties of rocks; Types of rocks - rock minerals, classification, description planes of discontinuity, weathering of rocks of defects; Engineering behaviour of rock masses and classification of weathered rocks and rock masses; Improvement of rock engineering properties; Foundation on rocks - bearing capacity - foundation of buildings, industrial structures, roads and railway, tunnels and hydraulic structures; Exploration of rocks, reconnaissance, surface investigations, insitu testing of rocks, geophysical techniques.

CIV5304: ADVANCED FOUNDATION AND UNDERGROUND CONSTRUCTION

Foundation Construction: Site preparation, temporary roads, site drainage, site preparation building areas. Deep trench and deep basement excavations. Bulk excavation and rock excavation. Stability of slopes to open excavations. Support of excavation by timbering and sheet piling. Retaining walls and sheet pile design. Shoring and Underpinning: Requirements for shoring and underpinning. Methods of shoring. Methods of underpinning. Tunnelling: Tunnelling in tough, medium-tough and soft rocks. Tunnelling by bores. Shield tunnel. Underground Construction: Culverts and conduits. Deep Foundation Design and Construction: Design of piles, pile load tests. Foundation design for dynamic conditions.

CIV5305 - PRESTRESSED CONCRETE DESIGN

Materials, prestressing systems, loss of prestress, analysis and design of sections in bending, shear, bond and bearing. Partial prestress and non-prestress reinforcement. Compression members. Design projects.

CIV5306 - ANALYSIS AND DESIGN OF TIMBER STRUCTURES

Properties of timber, analysis and design of flexural and compressive members. Axial load and bending connections. Design projects.

CIV5307 - ADVANCED CONSTRUCTION TECHNOLOGY

Concrete production, mix design and quality control; Advanced Concrete Technology: Concrete pavements, precast concrete - prestressed concrete, mass concrete - massive construction and underwater concreting. Concreting in extreme weather, cold weather and hot weather; Advanced Construction Plants and Equipment: General consideration, classification of plants and equipment; Characteristics of plants and equipment, performance calculations; Elevated Constructions: Silos, water tanks and bunkers. Formwork and scaffolding; Suspended Floors - Functional requirements of floors. Types of suspended floors; Roof Structures: Functional requirements of roofs, choice of roof structure and types of roof construction; Stairs: Construction of concrete and metal stairs.

CIV5308: RURAL AND URBAN TRANSPORT PLANNING

Transportation Systems: Characteristics, survey, analysis and planning; Traffic theory: Trip generation, growth and attraction, highway capacity; Planning theories, factors affecting land use; Environmental planning; Urban and rural traffic; Transportation development and growth in Nigeria and future developments.

CIV5309: ADVANCED TRAFFIC ENGINEERING

Traffic Planning: Traffic elements. Urban and rural traffic. Traffic theory; traffic flow and control, highway capacity, volume, level of service, introduction to traffic signal control, parking, traffic signs and markings; traffic safety engineering.

CHAPTER THREE

ACADEMIC AND EXAMINATION REGULATIONS

3.1 Introduction

The overall process of assessing a candidate's performance in a course may consist of a formal written examination, an assessment of coursework, a long essay, project defence or combination of any of the above as appropriate. Except as may be approved by the senate, examinations shall be held at the end of each semester at places specified by the relevant Department subject to any directives given by the senate.

3.2 Registration Procedure and Regulations

The following regulations should be generally observed during registrations:

1. Each student must register and pay the appropriate registration fees at the beginning of each session according to the registration process in operation during that session. The registration process includes getting copies of relevant documents signed and submitted to all relevant places as may be advertised by the University, Faculties and Departments.
2. Returning students must complete the registration process within two weeks from the date registration starts. A returning student who fails to complete the registration process within the two-weeks period approved for registration shall be deemed to be registering late and shall pay a late registration fee as may be prescribed by the University from time to time. Moreover, a returning student who fails to register within four weeks of commencement of the registration exercise shall not be allowed to register. Such a student shall be deemed to have withdrawn, unless he/she provides a reason acceptable to the Senate, in which case he/she can be considered for suspension of studies.
3. A fresh student must complete the registration process within two weeks of the close of the central registration of new students. Failure to complete the process within this time shall attract late registration

fee charges, or forfeiture of the admission. Provosts of Colleges, Deans of Faculties and Heads of Departments shall ensure that the registration process is completed on time, that the process is clearly explained and publicised to the students, and that all staff members involved in the exercise maintain effective office hours so that students could see them without hindrance.

4. The minimum credit load is 12 per semester and 30 per session, except in exceptional circumstances, such as:
 - a. Students on industrial/field attachment, internship, teaching practice, etc, where such an exercise lasts for a semester and its credit load is less than 12 and/or where the sessional credit load is less than 30 credits.
 - b. Spill-over students requiring less than 12 credits in a semester and/or less than 30 credits in a session to graduate.
 - c. Students with many carry-over courses in one semester.
5. Where the minimum credit requirement for a programme is more than 30 per session, the minimum credits for students of such a programme shall be that higher number. Thus, each student should workout the exact number of credits to be registered in conjunction with his/her Level Coordinator.
6. The maximum number of credits a student can register for in any session is the minimum credit requirement for his/her level, plus six. Thus, if the requirement for a Level 100 programme is 34 credits, then the maximum number of credits a Level 100 student of such a programme can register for is 40 (i.e. 34 + 6).
7. Courses are to be registered for by students sequentially. Thus, a student must register for Level 200 courses before registering for Level 300 courses. Moreover, when registering, a student shall first enter lower level courses (failed, or not taken, earlier) before entering higher level ones.

8. If a student fails a required course, he/she must register for it as a “carry-over” in all subsequent sessions until the course is cleared, except where prevented by industrial/ field/internship and similar attachments lasting a whole semester.
9. A student shall not repeat any course that he/she has passed, irrespective of the passing grade.
10. A student need not register for a failed non-required course, provided the credits requirements for the particular level of the course are satisfied. If the credit requirements are not satisfied, another course may be substituted for a failed non-required course, provided this is in line with departmental and faculty regulations.
11. A student cannot earn a credit in any course he/she has not duly registered for through the normal registration process, or the Add/Drop process. Thus, if a student sits for an examination for any course for which he/she has not registered, the result of such an examination shall be cancelled.
12. The results of all the courses registered by a student (except those dropped through the add/drop process) shall be reported. A student who registers for a course but fails to sit for its examination without valid reasons shall be deemed to have failed the course. Thus, a grade of ‘F’ shall be reported for such a student in the course. However, it shall be reported that the student was absent in the examination, so that he/she can be aware of the reason for the failure.
13. Where the results of a student are corrected after approval by Senate (such as confirming that a student reported absent had sat for the examination), the corrected result shall be reflected in the semester the courses were taken, and the normal approval process shall be followed

to get the corrected results approved and recorded in all concerned units.

Note: The procedure and conditions for the add/drop processes are as follows:

- a. Interested students shall collect the Drop/Add Form from the Directorate of Examinations, Admissions and Records (DEAR) after paying the appropriate fees at Bursary/designated banks.
- b. The student shall discuss the proposed changes with his/her Level Coordinator to ensure that the changes are in order.
- c. The changes need the endorsement of all concerned departments and faculties.
- d. The changes in registration must be in line with the following: the requirements for minimum and maximum number of credits per semester and session; and regulations of the University, the Faculty, Department and programme.
- e. The Drop/Add process (including returning the forms to all relevant units) must be completed within three weeks of the commencement of lectures in the semester.
- f. A student can neither add, nor drop, a course when more than 20% of it has been covered.

3.3 Standard of Tests and Examinations

The standard of tests and examinations complies with the Benchmark Minimum Academic Standard (BMAS) of NUC. The grading for courses is based on the continuous assessment (CA) and the final examination. The CA comprises of sets of tests and assignments to assess the current understanding of students as the courses are being taught. Each course is assessed based on CA, and a written examination to be given at the end of the semester in which the course is offered. The ratio of CA to written examination is usually 30-40% CA and 60-70% examination. However, in some courses such as Laboratory practical and Drawings, the ration of CA to written examination is usually 50:50. The minimum pass mark is 45% that is D grade.

The duration of a written examination of an undergraduate course depends on the credit hours. An external moderator will be involved in moderating the

examination questions and the sample marking schemes. The manner of the involvement of the external moderator shall be as prescribed under the regulations applicable to the undergraduate Programme.

A student is required to present himself/herself for examination in all the courses for which he/she is registered. In order to be eligible for examination in a particular taught course, a student shall have attended a minimum of 75% of the total periods of formal instructions delivered for the course. An attendance requirement shall be calculated, taking into account all the types of instructions used in the course.

3.4 Grading of Students' Work

Grading of courses is done by a combination of percentage marks and letter grades translated into a graduated system of Grade Point Equivalent (GPE). For the purpose of determining a student's standing at the end of every semester, the Grade Point Average (GPA) system is used.

Table3. 1: Grading system

Score	Letter Grade	Grade Point
70-100%	A	5
60-69%	B	4
50-59%	C	3
45-49%	D	2
0 - 44%	F	0

Each course is graded out of maximum of 100 marks (made up of continuous assessment and written Examination) and assigned appropriate Grade Point Equivalent as shown in Table 3.1. The Project is graded over 100% without any written examination. The main concepts used in the semester system are: Credit Unit (CU), Grade Points Average (GPA), Cumulative Grade Points Average (CGPA), Probation, Carry-over, Withdrawal, Spill over and Grading System.

3.4.1 Credit Unit (CU)

Credit Unit (CU) represents the weight assigned to the course, and is recorded in credit hours. One credit is considered as one hour of classroom lecture per week or two hours of laboratory time per week. Thus, CU consists of specified

number of student teacher hours/week/semester. For instance, CIV3301 is a level 300 course with 3 hours' lecture period/week/semester.

3.4.2 Grade Point (GP)

This involves assigning numerical or alphabetical letter to the scores of students at examinations, reports, projects or papers. Letter systems generally run from A (5 points), to B (4 points), C (3 points), D (2 points), and F (0 point).

3.4.3 Grade Point Average (GPA)

This refers to the evaluation of students' performance in any semester. It is the average of weighted grade points earned in the courses offered by a student in a semester. The GPA is calculated as follows:

$$GPA = \frac{TPE}{TCR}$$

Where;

TCR = Total Credits Registered in a semester

TPE = Total Points Earned in that semester

Example:

The Tables 1 & 2 below show first and second semester results of a level 100 student

Table 1: First Semester results

S/N	Course Code	Course Title	Credit Unit Registered	Grade	Points Earned
1	CHM1231	Inorganic Chemistry	2	A	2 x 5 = 10
2	CHM1241	Organic Chemistry	2	B	2 x 4 = 8
3	CSC1201	Introduction to Computer Science	2	C	2 x 3 = 6
4	MTH1301	Elementary Mathematics I	3	D	3 x 2 = 6
5	STA1311	Probability I	3	A	3 x 5 = 15
6	PHY1170	Physics Practical I	1	B	1 x 4 = 4
7	PHY1210	Mechanics	2	F	2 x 0 = 0
8	PHY1220	Electricity and Magnetism	2	B	2 x 4 = 8

9	GSP1201	Use of English	2	C	2 x 3 = 6
Total			TCR = 19		TPE = 63

Table 2: Second Semester results

S/N	Course Code	Course Title	Credit Unit Registered	Grade	Points Earned
1	CHM1251	Physical Chemistry	2	C	2 x 3 = 6
2	CHM1261	Practical Chemistry	2	C	2 x 3 = 6
3	MTH1302	Elementary Mathematics II	3	D	3 x 2 = 6
4	MTH1303	Elementary Mathematics III	3	F	3 x 0 = 0
5	PHY1180	Physics Practical II	1	A	1 x 5 = 5
6	PHY1230	Behaviour of Matter	2	B	2 x 4 = 8
7	GSP1202	Use of Library, Study Skills and ICT	2	A	2 x 5 = 10
Total			TCR = 15		TPE = 41

3.4.4 Cumulative Grade Point Average (CGPA)

The CGPA represents an up to date average (i.e. cumulative) of the GPA earned by the student in at least two semesters. It is an indication of the student's overall performance at any point in his training at the university. CGPA is attained after two semesters or more in an academic programme. Example: $CGPA = (TPE_{1st\ semester} + TPE_{2^{nd}\ semester}) / (TCR_{1st\ semester} + TCR_{2^{nd}\ semester}) = (63+41) / (19+15) = 4.33$.

3.4.5 Academic Probation

A student who fails to earn a minimum of GPA of 1.50 point at the end of two semesters would be placed on probation for another academic session. Probationary status is removed if a student placed on probation attains a minimum CGPA of 1.50 or above in the following academic session. He will be notified by his level coordinator.

3.4.6 Incomplete Grading

If a student earns 75% lectures attendance in a course but due to sickness or accident or other acceptable reasons is unable to write the semester

examination, he/she should apply for incomplete grading to retain his/her continuous assessment (CA) and be allowed to write the examination for that course at a later date.

3.4.7 Withdrawal from Studies

Withdrawal from the University shall be recommended by the Faculty Boards of the Senate on any of the following grounds:

- a. Failure to register within the time set by Senate for registration.
- b. Failure to obtain a CGPA of at least 1.50 after a probation period.
- c. A failure rate so great that, at the point of consideration, the student would not be able to graduate within the remaining time available to him/her even if (s)he is to register for, and pass, the maximum number of credits allowed by the regulations in each of the sessions available to him/her. For example, if a student has only a maximum of two sessions to earn 90 credits and she/he can register for only 40 credits per session.
- d. Failure to attend classes for a period which exceeds 30 consecutive days except upon approved medical or other grounds.
- e. Failure to complete the stated requirements for the award of a degree or diploma within the maximum number of semesters laid down for the programme.
- f. Failure to sit for the entire semester examinations without any admissible reason.

3.4.8 Carry Over (CO)

A student who fails to earn a minimum of 45 marks in a course (continuous assessment and examination) will be asked to carry over (CO) the course to the next available period and get it registered bearing in mind that he/she will be allowed to register a maximum number of credits per semester. Continuous assessment (CA) carries 30 marks while examination carries 70 marks for all conventional course work whereas for practical course, CA carries 60 marks and examination carries 40 marks.

3.4.9 Spill Over

A student who fails to pass a registered CORE course at the end of approved regular years of programme studies in the University will not graduate. That is, he/she has to spill over for a maximum of four (4) semesters.

3.5 Suspension of Studies

If a student falls sick or suffers an accident after registering for a programme in the University, such a student should apply with relevant medical reports (subject of satisfaction of the Director, University Health Services) to the Dean of his/her faculty through the Head of Department for Suspension of Studies of a semester or a session (as the case may be) to enable him/her fully recover. However, such request will not be counted within his/her maximum allowable period of stay for a degree.

3.6 Attendance Requirements

Students must attain at least 75% attendance of lectures, tutorial and practical work before being allowed to sit for examination. Students who did not attain **75% attendance** of lectures in any course of the Department will not be allowed to sit for examination.

3.7 Degree Classification

Determination of the class of degree is based on the Cumulative Grade Point Average (CGPA) earned at the end of the programme. The CGPA is used in the determination of the class of degree according to the Table 3.2.

Table 3.2: Class of degree and corresponding CGPA

Class of Degree	CGPA
First Class	4.50 - 5.00
Second Class Upper	3.50 - 4.49
Second Class Lower	2.40 - 3.49
Third Class	1.50 - 2.39

3.8 Examination Regulations

The University has drawn examination regulations to clarify the legitimate expectations and corresponding responsibilities of all staff and students. It is intended to ensure that the University's examinations are organized and conducted in a consistent and professional manner. These regulations apply at all examinations/assessments in the University (including continuous assessment test, tutorials and take home assignments.) Some of the regulations are as follows:

- a. Attendance at lectures, practical's and examinations are compulsory, and anyone who does not attend a lecture, practical and examination at the time and place published in the examination time-table will be deemed to have failed in that part of the assessment.
- b. Students who have clashes in examinations based on the time-table should immediately inform their departmental examinations officer before the commencement of the examination. Students who fail to inform the appropriate officers of the University of Likely Clash in examinations shall blame themselves for any difficulty or eventuality that may arise.
- c. It will be the responsibility of each student to make sure that he is aware of the final examination time-table. Students are to expect changes of date, time and venue of examination before the examinations start.
- d. Each candidate should be at the examination room at least ten (10) minutes before the advertised time of the examination. He is required to supply his own writing and drawing instruments. He is also required to supply any other examination aids of which the provision is prescribed in the rubric of the question paper, and announced to candidates in advance, as being his own responsibility.

- e. Candidates for any examination in the university are to conduct themselves properly in and around the examination hall. Deviation from proper conduct may constitute examination misconduct, which are punishable by the university prescribed penalties.
- f. A student shall bring his identity document to each examination and display it in a prominent position on his desk.
- g. Any book, paper, document, examination aid (except as may be provided for in the rubric of the question paper and announced to the candidates in advance) handbag or briefcase which is brought to the examination room must be deposited at the Invigilator's desk, or a place designated for the purpose, before the start of the examination. In no circumstances must it be placed on or near any candidate's writing desk.
- h. Each student shall sign in by completing a line on the attendance register - writing his/ her registration number, name, answer booklet number and department and then signing. Students should be advised to note their serial number and attendance register number (in case there are more than one registers) for the ease of signing out.
- i. A candidate arriving late shall be admitted up to thirty minutes after the start of the examination, but he shall not be allowed extra time. If he arrives more than thirty (30) minutes late but before one half of the total duration of the examination has elapsed, the Invigilator may at his discretion admit him if he is satisfied that the candidate has good reason for his lateness, and provided that no candidate has already left. No candidate shall be admitted after half the duration of the examination has elapsed. The Invigilator shall report on all those admitted late to the Faculty Examinations Officer who shall inform the Chief Examiner. The Chief Examiner shall recommend to the Board of Examiners whether to accept the student's paper or not.

- j. At the end of the time allotted, each student shall stop writing when instructed to do so and shall gather his scripts together. He/she shall then remain at his desk until all candidate's scripts have been collected, and he has given permission by the Invigilator to leave. It shall be the candidate's responsibility to ensure that his answer scripts are collected by a University official in the examination room before he leaves.

3.9 Examination Misconduct and Leakages

Candidates for any examination in the University are to conduct themselves properly in and around the examination halls. Deviations from these proper conducts may constitute examination misconduct which are punishable by the penalties described below.

The vicinity of an examination hall is considered to be part of the examination hall. Thus, any student caught with unauthorized materials or writing in the vicinity of the examination hall (after the student has seen the question paper) shall be treated as if the materials are found on him/her in the examination hall. Similarly, any student caught cheating in any way in students' hostels or other areas shall be appropriately treated.

Any student of the University who commits an offence punishable in any other institution will be treated as if he/she has committed such an offence in the University, and shall therefore be liable for any appropriate punishment.

Examination misconduct cases discovered during the marking of the examination scripts are also subject to appropriate investigations and further necessary action.

3.9.1 Procedure for Investigating Examination Misconduct and Leakages

1. If any student is found to be, or is suspected of, infringing the provisions of these Regulations or in any way cheating or disturbing the conduct of an examination, the Invigilator shall take possession of any relevant evidence, fill the relevant form, obtain statement(s) from the student(s) concerned by giving him/her/them the relevant forms to fill and/or make them sign exhibits.

2. A student accused of involvement in examination misconduct shall be allowed to continue with the examinations provided no disturbances are caused. He/She shall sign any exhibits collected from him/her and give his/her own version of events by completing the appropriate form.
3. After the examination, the invigilator shall submit his/her report(s), the form(s) completed by the students and all exhibits and other documents on all examination misconduct cases to the Faculty Examinations Officer.
4. Upon receipt of any case of examination misconduct, the Faculty Examinations Officer shall report to the Dean, who shall set up a committee to investigate the case further.
5. The Faculty Committee on Examinations Misconduct shall invite all students accused of involvement to defend themselves of the accusations. A widely publicized notice on notice-boards which gives the names and registration numbers of the students being invited as well as the date, time and venue of the Committee's deliberations shall serve as enough evidence of invitation, but invitation letters may also be sent to individual students. Students that fail to honour the first invitation shall be given a second chance.
6. A student accused of involvement in examination misconduct should defend himself before the Faculty Investigative Committee set up by the Dean.
7. After hearing from all concerned, the Committee shall write a comprehensive report on each case brought before it clearly indicating its findings, as to the degree of involvement, or otherwise, of each accused. It shall submit the report together with all relevant documents to the Senate Committee on Examination Misconduct and Leakages.
8. After going through the reports of the Faculty Committees on Examination Misconduct and carrying further investigations (where that becomes necessary), the Senate Committee shall report to Senate recommending the appropriate punishment to any student found to be guilty.

9. A staff member who reports a case of examination misconduct shall not sit on a Faculty or Senate Examination Misconduct Committee when the Committee is considering the case.
10. If the question paper for an examination that is yet to take place is suspected as having been leaked, the Chief Examiner shall immediately:
 11. Withdraw the paper and cause another one to be set in its stead, even if this means shifting the examination date and/or time forward;
 12. Report the matter to the Dean who shall further direct the Faculty Committee on Examination Misconduct to investigate the case as a matter of urgency.
13. If the question paper for an examination that has already taken place is suspected as having been leaked, the Chief Examiner shall immediately:
 14. Report the matter to the Dean who shall further direct the Faculty Committee on Examination Misconduct to investigate the case as a matter of utmost urgency.
 15. Report to the Vice-Chancellor who is the Chairman of Senate.
16. If the Faculty Committee confirms that a paper that was already taken has indeed leaked, the Dean shall cause the paper to be cancelled and another one set in its place. The Dean shall brief the Vice-Chancellor about the case.

3.9.2 Categories of Offences and Punishments

The following are the categories of examination misconduct and leakage offences, as well as the appropriate punishments for the offences.

A. Category of Offences Punishable by Expulsion from the University

1. Impersonating another student, or being impersonated by another student at an examination.
2. Exchanging names and/or numbers on answer scripts/sheets.
3. Introduction and use of relevant unauthorized material(s) into the examination hall.
4. Exchange of materials (such as question papers, examination cards) containing jottings which are relevant to the ongoing examination in the examination hall.

5. Theft and/or illegal removal of examination scripts.
6. Any kind of mischief likely to hinder the smooth conduct of the examination. For example causing fire, flooding, or engaging in physical violence.
7. Collaborating with, or copying from, another candidate.
8. Cheating outside the examination hall, such as in toilets, hall of residence, etc.
- 9. *Use of mobile phones or any other unauthorized electronic device.***
10. An offence which falls under category B committed by a student who was previously rusticated.
11. Any offence under this category committed by a student of this University in another institution.
12. Destruction of exhibit by candidates.
13. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant expulsion.

B. Category of Offences Punishable by Rustication

- a. Facilitating/Abetting/Aiding cheating by another candidate.
- b. Introduction, but not use, of relevant unauthorized materials to the examination hall.
- c. Acts of misconduct (such as speaking/conversation) during the examination which is likely to disrupt the conduct of the examination.
- d. *Bringing mobile phones or any other unauthorized electronic device into the examination hall.***
- e. An offence in category C committed by a previously warned or rusticated student.
- f. Any offence under this category committed by a student of this University in another institution.
- g. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant rustication.

C. Category of Offences Punishable by Written Warning

1. Introduction of unauthorized irrelevant materials into the examination hall.

2. Writing on the question paper.
3. Any offence under this category committed by a student of this University in another institution.
4. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant warning.

3.9.3 Misconducts Related to Projects, Essays, etc.,

Students of the Department of Agricultural and Environmental Engineering and the University as a whole are reminded to strictly adhere to the universally accepted high standards of academic integrity while writing any work related to the programme. Deviations from these high standards may constitute misconducts which are punishable by expulsion, rustication or warning depending on the nature of the misconduct. Some of the offences include the following:

A. Offences Punishable by Expulsion

- a. Submitting a final year project that was done by someone else.
- b. Submitting, as final year project, a work submitted earlier for another purpose (by him/ herself or by others, at the University or somewhere else).
- c. Repackaging a whole project as his/her own product.
- d. Any other offence related to final year project deemed by the Committee to merit expulsion.

B. Offences Punishable by Rustication

- a. Substantial plagiarism of the work (s) of others in final year projects.
- b. Fabrication or intentional misrepresentation of data, experimental results, analysis, etc used in final year projects.
- c. Intentional sabotage of the final year project (or part thereof) of other students.
- d. Any other offence related to final year project deemed by the Committee to merit rustication.
- e. Any of the offences in categories B. and C. committed by a student in respect of homework, assignment, and other aspects of the continuous assessment of a course would lead to an 'F' grade in the course.

3.10 Notification of Examinations Results

- a. No results of any examinations will be announced until after they have been approved by SBC or Senate, as the case may be. However, the Chairman of the Senate may give approval in advance for the earlier announcement of results on a provisional basis and subject to Senate approval, to be made in case where special urgency exists.
- b. The results of semester examinations for all levels should be released after the approval of the Senate or SBC, as the case may be.
- c. Unless otherwise approved in advance by Senate, written statements of first semester results shall not be issued to a student or other unauthorized person.
- d. At other times Deans and Heads of Departments may make known to students, either verbally or by posting lists in a public place within the University area, the SBC/ Senate approved summary of the results as well as the letter grades which they have obtained in their courses.
- e. After the Senate has approved the results of an examination, a report of each session's performance (except the final "classified" performance) shall be issued to each student by the Departments. Each report must be signed by the Head of the relevant Department.
- f. Transcripts of examinations results shall be signed and stamped by Deans of Faculties and countersigned by the Registrar or his representative and shall be in such form as may be approved from time to time.
- g. One copy of a transcript showing grades obtained will be given on request to a candidate on completion of his programme of studies. Such copy of the transcript cannot be used for official purposes, and this shall be so indicated on the copy. Further copies will be issued subsequently, but sent directly to institutions, on request and on payment of a prescribed fee to the University.
- h. Certificates of the award of degrees and diploma approved by the Senate shall be sealed with the Common seal of the University and signed by the Vice-Chancellor and the Registrar.
- i. Any student accused of involvement in examination misconduct, leakage of question papers or misconduct related to academic writings has a

right to fair hearing. Indeed, a number of the proceeding provisions are meant to guarantee that. However, refusal/failure by a student to fill the appropriate form giving his/her own version of events, or to appear before a Faculty Committee should not be viewed as denial of such rights.

- j. Any student punished by Senate for involvement in examination misconduct, leakage or other academic misconduct may appeal directly to Senate indicating the grounds of the appeal and attaching any supporting documents. The onus is on the appellant to make a case for Senate to reconsider its earlier decision on him/her.
- k. Upon receipt of an appeal from a student punished for involvement in examination misconduct, leakage or other academic misconducts, Senate or its Chairman, shall refer it to the Senate Appeal Committee on Academic Misconduct. The Committee shall consider each appeal on its own merit; depending on the grounds of the appeal and any supporting document provided by the appellant and make appropriate recommendations to Senate.

3.11 Maternity Leave

A female student must submit a medical certificate showing the expected date of delivery not less than six weeks in advance of the date. She can be granted exemption from coursework for a period of 12 weeks, commencing six weeks before the date of delivery the postponement of an examination, until the next scheduled opportunity, will normally be allowed only if the examination occurs within a period beginning six weeks before the expected date of delivery. The board of the examiners may at its discretion extend this period on receipt of a medical statement indicating exceptional circumstances. Exemption from coursework during maternity leaves as above will be permitted only once during a Programme of study. If the expected date of delivery interferes considerably with a semester programme, the department concerned may require the semester's work to be abandoned and taken up at the next available opportunity.

3.12 Sick-Leave Certificate

- a. If a student falls sick while resident in the university campus or in the Kano municipal area, each such leave certificate must be obtained from the university clinic or from the doctor or hospital to which the student is referred from the university clinic. In the latter case, the certificate should be on official headed form, stamped and counter-signed by the Head of Department or the Medical Superintendent in charge of the hospital, as appropriate. Such sick-leave certificate obtained outside the university must be endorsed by the Director of the University Health Services Department.
- b. If a student falls sick outside the Kano Municipal Area or is taken in emergency to a hospital in Kano, he/she must similarly obtain his/her certificate from a Medical Officer employed by a University or by a Government Hospital on an official headed form, stamped and counter-signed by the Head of Department or Medical Superintendent in charge of the Hospital, as appropriate.
- c. If a student falls sick outside Nigeria, he/she must send without delay an official sick-leave certificate to the Director, University Health Services, who may at his discretion refer the certificate without authentication to the Nigerian Diplomatic representative in the country concerned, or to any other appropriate body.
- d. If a student is granted a sick-leave or maternity leave before the examination and he/she decides to take the examination, the sick-leave or maternity leave shall be withdrawn and he/she will be obliged to take all the examinations.
- e. Note that all sick-leave certificates obtained outside the University must be endorsed by the Director, of the University Health Services.

3.13 Submission of Sick-Leave Certificate

- i. If the student obtained sick-leave certificate from the university clinic as in (a) above, he/she must present it personally or through a messenger without delay to the Head of his/her Department and obtain an acknowledgment for it.

- ii. If the certificate is obtained from a doctor to whom he/she is referred in Kano as in (a) above, it must be presented personally or through a messenger without delay to the Director, University Health Services, and obtain an acknowledgment for it.
- iii. If the certificate is obtained, as in (b) above, it must be sent immediately by a messenger or by a registered post to the Director, the University Health Services and an acknowledgement of the delivery or posting (as appropriate) obtained. If sent by the post, a copy must be retained by the student. Meanwhile, the student must endeavor to notify the Head of Department by the telephone, or by a messenger, stating his/her exact address and the number of the days of sick-leave given.
- iv. In all cases, the acknowledgement for the delivery or the posting of a certificate, the copy where appropriate, must be retained and produced to the Head of Department if required later.
- v. On receipt of a certificate issued by another doctor, the Director of the University Health Services will notify the Head of the student's Department. The Director may consider it necessary to send a member of the Health Services Staff to verify the student's condition, and any change of address or condition must be communicated to the Director without delay. A certificate will not be further considered by the Director if the address given is found to be false.

3.14 Suspension of Studies

Registered students are eligible to apply for suspension of studies either on medical grounds or on financial grounds. If a student falls sick or suffers an accident after registering for a programme in the University, such a student should apply with relevant medical reports (subject of satisfaction of the Director, University Health Services) to the Dean of his/her faculty through the Head of Department for Suspension of Studies of a semester or a session (as the case may be) to enable him/her fully recover. However, such request will not be counted within his/her maximum allowable period of stay for a degree.

3.15 Dressing and Dress Code

Dress Code is here defined as any appropriate or formal or informal dress and dressing style in which there is no attempt or will to expose the body's intimate parts. A dress should have sleeves and extend from the neck to just below the knees. Students of the Department of Agricultural and Environmental Engineering and the University as a whole are required to dress decently at all times. The following types of dresses are prohibited:

1. Transparent dress that highlights or emphasizes the body's, sensual parts, such as the thighs, breasts, etc.
2. Unbuttoned shirts without a t-shirt or a singlet, or an under wear cloth.
3. Clothes that illustrate, enhance, or depict drugs, alcohol or have offensive and violent messages.
4. Clothes that display weapons or any gang-related illustrations and messages.
5. T-shirts or clothes with obscene captions.
6. Shorts and skimpy dresses e.g. body hugs, show-one-your-chest, and dresses exposing sensitive parts.
7. Tights, shorts and skirts that are above the knees (except for sporting purposes).
8. Wearing of ear-rings by male students.
9. Plaiting or weaving of hair by male students.
10. Wearing of coloured eye glasses, not on medical grounds in the classroom.

3.15.1 PENALTIES FOR VIOLATION OF THE DRESS CODEE

1. Violators will not be allowed into classrooms, lecture halls, laboratories, and offices of the university.
2. Violators will not be allowed in examination halls.
3. Repeated offenders will face disciplinary action.

CHAPTER FOUR

IMPORTANT OFFICERS/RESPONSIBILITIES AND THEIR FUNCTIONS

4.1 Head of Department

Functions:

1. The Head of Department will, with diligence and hard-work, exercise general superintendence over the academic and administrative affairs of the Department.
2. He is to give sound academic and administrative leadership to the Department.
3. He is to encourage democratic participation by members of staff in running the affairs of the Department.
4. He is the financial officer of the Department.

4.2 Departmental Examination Officer

Functions:

1. The Departmental Examinations Officer is responsible to attend any meeting concerning examinations and Central Time table Scheduling Committee of the Faculty.
2. In line with the central time table scheduling committee, the Departmental exams officer is responsible for designing examinations time table.
3. To source, secure and manage examinations materials and venues.
4. To supervise the conduct of examinations in the department.
5. To draw the attention of the Head of Department to any problem arising during and after examinations.
6. To arrange and facilitate the exchange of raw marks and scripts among the departments in the Faculty and beyond.
7. To treat any other issue incidental to its duties.

4.3 Departmental Secretary

Functions:

1. Responsible for the updating and handling of Departmental records as

regards staff, admissions, registration and examination.

2. To serve as Secretary at Departmental meetings including Departmental Board of Examiners (DBE), Departmental Board of Studies (DBS), meeting, Departmental Postgraduate Committee meeting, Departmental Appointment and Promotion Committee (A & PC) and other committees chaired by the Head of Department.
3. To operate the Departmental vote-books on the instruction and approval of the Head of Department.

4.4 Level Coordinator

Functions:

1. Every level (100 - SPO II) has an academic staff assigned to it as Level Coordinator.
2. He keeps the files of students in his custody with the registration details of the students.
3. He compiles examination results of the students and submits same to the Departmental Board of Examiners for consideration.
4. He/She issues students with sessional transcripts.
5. He/She generally serves as a student's counselor on academic and other matters.
6. To treat any other issue incidental to its duties.

4.5 Departmental Boards

7. The Departmental Administration is led by the Head of department (HOD) who is directly answerable to the Dean of the Faculty. The Departmental Administration is run via two (2) Departmental decision making organs; the Departmental Board of Studies and the Departmental Board of Examiners. These departmental decision organs deliberate on issues bothering on departmental affairs, staff and student's welfare.
8. The departmental board of studies consists of all the senior staff members of the department. The board deliberates on all the non-examination general issues bothering on the running of the department, staff welfare and student's academic and non-academic matters.

9. The departmental board of examiners on the other hand consists of only the academic staff members of the department. The board deliberates on all examination matters, which include vetting and approval of results, among others. The functions of the board are effectively achieved by assigning specific responsibilities to the academic staff members of the department, such as examination officer, level coordinators, time-table officer, registration officer, SIWES coordinator, etc.
10. The department also has postgraduate Board which consist all members of staff who are PhD holders or reached a rank of lecturer I. This board discuss issues related to postgraduate matters.

4.6 Admissions Committee

Functions:

1. To present and defend the departmental admission lists (Undergraduate) at the Faculty Admissions Committee meetings.
2. To coordinate admissions of the department in line with the approved guidelines.
3. To make recommendations on ways of improving admissions exercise at the Faculty.
4. To treat any other issue incidental to its duties.

4.7 Research Committee

Functions:

1. To coordinate the activities of various focused research groups.
2. To liaise/work with the University Research Committee in identifying means of funding individual and group research by members of the Department.
3. To establish mutual relationship with various organizations and funding agencies outside the University in furtherance of its functions.
4. To encourage departmental members to develop research proposals, including interdisciplinary and identify sources of funding them.
5. To obtain and disseminate information on research opportunities and sources of funding to the departmental members.

6. To treat any other issue incidental to its duties.

4.8 Seminar Committee

Functions:

1. To organize departmental seminars where members are encouraged to develop papers for presentation.
2. To assess and approve papers before presentation and inclusion in the Faculty/Departmental Seminar.
3. To organize seminars and symposia on topical issues in the society.
4. To collaborate with outside institutions/organizations in organizing seminars and conferences (both national and international).
5. To treat any other issues incidental to its duties.

4.9 Database Committee

Functions:

1. To compile and prepare an update database for the Department.
2. To periodically be updating the database.
3. To compile and prepare an update of database for all departmental projects and books both in hard and soft copies.
4. To treat any other issue incidental to its duties.

4.10 Accreditation Committee

Functions:

1. To prepare for both NUC and COREN accreditation exercises with a view to ensuring 100% compliance.
2. To represent the Department in the Faculty and University accreditation committee activities and present progress report on the level of preparedness to the departmental board.
3. To ensure that the department meets up with major and minor accreditation requirements before the arrival of accreditation teams.
4. To discharge such other incidental duties that might be assigned to it by the Head of Department.

4.11 Quality Assurance and Control Committee (HOD and all Senior Academics)

Functions:

1. To watch over the total administration, staff, students and all the activities in the Department.
2. To mentor new/young academics staff.
3. To monitor and assess quality of admission and its process.
4. To monitor and assess quality of lecturers and lectures.
5. To monitor and assess compliance to the approved course contents.
6. To monitor and checkmate moderation of question papers marking schemes marked scripts and moderators.

4.12 Project Evaluation and Prototype Development Committee

Function:

1. To identify potentials of undergraduate and postgraduate projects to be considered for prototype development.
2. To be responsible for project prototypes presentation at national exhibitions.
3. To treat any other issue incidental to its duties.

4.13 Farm/Laboratory/Workshop Operation Committee

Function:

1. To compile/take an inventory of the machinery available in the department.
2. To take the inventory of the departmental farm size.
3. To recommend measures to be taken to ensure the security of the farm equipment.
4. To retrieve the farm/laboratory equipment borrowed by other department(s).
5. To recommend to the Head of Department for the release of any farm machinery/laboratory equipment requested for use outside the department.
6. To ensure proper land allocation to interested staff and others.

7. To ensure proper record of financial transaction during farm operation activities.
8. To ensure proper maintenance for farm/workshop/laboratory operation equipment.
9. To prepare and present a comprehensive report of the farm/workshop/laboratory operations to the Departmental Board of Studies at the end of every session.
10. To treat any other issue incidental to its duties.

4.14 Orientation and Welfare Committee

Function:

1. To organize and conduct orientation for both new staff and students.
2. To decide and arrange departmental representations at wedding, condolences, etc as the need arises.
3. To arrange special intervention in cash/kind for staff or students, when the need arises.
4. To treat any other issue incidental to its duties.

4.15 Sports Advisory Committee

Function:

1. To advise the department on the sporting activities to be organized or patronized.
2. To fish out talented sports men and women in the department, amongst staff and students, through organized sporting competitions.
3. To develop teams that will represent the department in sporting competitions within and outside the University.
4. To treat any other issue incidental to its duties.

CHAPTER FIVE

