DEPARTMENT OF AGRICULTURAL & ENVIRONMENTAL ENGINEERING

FACULTY OF ENGINEERING

BAYERO UNIVERSITY, KANO-NIGERIA

UNDERGRADUATE

STUDENTS' HANDBOOK

2024/2025 Session

DEPARTMENT OF AGRICULTURAL & ENVIRONMENTAL ENGINEERING

FACULTY OF ENGINEERING

BAYERO UNIVERSITY, KANO-NIGERIA

UNDERGRADUATE STUDENTS' HANDBOOK

Bayero University Crest

The Crescent and the Star.

The Crescent: (Symbol & Unit of Time) — **Jāmiatu Bayero bi Kano (Bayero University, Kano)**

The Star: (Guiding Light). — ***Motto:*** **WA FAWQA KULLI DHI 'ILMIN 'ALĪM i.e**

"----- 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.

As Presented by the Registrar, and printed by Kic-Dal.

Officers and Establishment

Department of Agricultural and Environmental Engineering

Faculty of Engineering

Bayero University, Kano-Nigeria

Year of Establishment: 2001

Vice Chancellor

Professor Haruna Musa, fsi, FICCON, FFIN, FITRAN

PhD, (Bristol), MSc., BSc.. (BUK)

Registrar

Haruna Aliyu

BSc, MSc., MBF, (BUK), *FCAI*

Dean of Faculty

Engr. Prof. Abdussamad Umar Jibya

B.Eng., M.Eng, (BUK), PhD, (IIUM), Reg. COREN

Head of Department

Engr. Dr. Nuraddeen Mukhtar Nasidi

B.Eng., (BUK) MSc, (ABU), PhD, (UPM), MNIAE, Reg. COREN

Vision, Mission and Core Values of the University

Vision

Bayero University shall be a world-class university in Africa, renowned for its excellence in teaching and research and quality of its products.

Mission

To provide world-class academic and professional training and community service, and to conduct research for the advancement of society, and to produce high quality human resources with entrepreneurial skills for the development of the community, the nation and humanity in general

Core Values

Humility and Sacrifice: Discipline and Commitment; Integration and Internationalization; Professionalism and Good Governance; Innovativeness and Creativity; Excellence and Best Practices

Table of Contents

FOREWORD

It is my pleasure to write the Foreword of this very important document the Undergraduate Students' Handbook of the Department of Agricultural and Environmental Engineering, Bayero University, Kano-Nigeria. It is a very important document in the sense that it is intended to guide you and give you direction during the whole of your stay here at the University. The Handbook has been carefully prepared with the objective of giving you all the necessary information that you require not only in understanding the structure of the Bachelor of Engineering (Agricultural) programme but also the rules, regulations and guidelines that you need to follow to enable you successfully pursue your studies in the Department and indeed, the University.

The Handbook covers a wide range of areas that, if carefully read and fully internalized, will make your study and, indeed stay at the Bayero University, Kano-Nigeria successful, pleasant, and rewarding. The areas include philosophy, aims and objectives of the programme, admission requirements, graduation requirements, course outline, and course description, general academic regulations, conduct, misconduct and discipline, dressing and dress code, among others. I urge you to read this Handbook carefully and make good use of it. For the avoidance of doubt, you are reminded that your degree certificate is awarded based on **character** and **learning** and not on **learning** alone. You are required to be hard-working and to always strive for excellence. You are also required at all times to maintain discipline and obey the University's Rules and Regulations. The University will neither tolerate violation of its rules and regulations nor those who cross the bounds of decency. At the same time, the Department and the University as a whole will do everything possible to assist you in realizing your legitimate objectives, which is your fundamental reason for coming to the University.

I wish you a very pleasant and successful stay at the Bayero University, Kano-Nigeria.

Prof. Haruna Musa,
Vice-Chancellor,
Bayero University, Kano-Nigeria

MESSAGE FROM THE DEAN, FACULTY OF ENGINEERING

I welcome you to the Department of Agricultural and Environmental Engineering, one of the six Departments in the Faculty of Engineering, Bayero University, Kano-Nigeria. I am proud of the giant strides being made by the Department since its inception in 2001.

This handbook is an important source of information for those desiring to know more about the Department and its programme. I am pleased to note that the leadership of the Department of Agricultural and Environmental Engineering has actively engaged in a systematic production of this issue of its handbook. I call upon the students both old and new to be hard working, disciplined and abide by the rules and regulations of the university.

I wish you successful stay in this Faculty and the Department of Agricultural and Environmental Engineering.

Engr. Prof. Abdussamad Umar Jibya,
Dean, Faculty of Engineering,
Bayero University, Kano-Nigeria

MESSAGE FROM THE HEAD, DEPARTMENT OF AGRICULTURAL AND ENVIRONMENTAL ENGINEERING

Welcome from the Head of Department

The Department of Agricultural and Environmental Engineering is one of the few units in Bayero University, Kano-Nigeria that is blessed with versatile teaching and non-teaching staff. The department runs both undergraduate and postgraduate programmes. All our staff members hope that you will enjoy an interesting and worthwhile time at the university and we look forward to working with you over the next few years. We are a department of enthusiastic engineers/researchers and our research and teaching align closely to give you the best learning experience. Students are given course outline and reading list in each course at the beginning of every semester. The staff-student relationship is cordial. Lecturers are accessible and eager to assist the students. It becomes departmental culture that lecturers keep hours during which students with problems can stop-by and attend to them. There is Level Coordinator for every level who is an academic staff appointed by the department to serve as an adviser for that level. His main responsibility is ensuring that students register the required courses and guide them on credit load.

This handbook outlines courses and requirements for admission and graduation for the students in Bachelor of Engineering (Agricultural) programme, feel free to go to your level coordinator, if you have any question. The programme is designed to enable students to develop a variety of theoretical knowledge and practical skills that are in demand from both the public and private employers within contemporary Nigeria and outside. The student handbook cannot be exhaustive, however, and so one of its roles is to explain how to obtain more information on any given issue/topic when you need it. Many of the issues/topics covered will be greatly amplified during the Departmental Orientation Day (DOD). Some issues/topics however will only become relevant as your programme goes on, so it is a good idea to keep referring to this handbook.

It is with this in mind that I welcome you to the Department of Agricultural and Environmental Engineering, and challenge you to take advantage of the programme and facilities in the Department.

Best of luck with your studies.

Engr. Dr. Nuraddeen Mukhtar Nasidi,

Head, Department of Agricultural and Environmental Engineering,

Bayero University, Kano-Nigeria

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 Agricultural and Environmental Engineering, I warmly welcome you to the Department of Agricultural and Environmental 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 schools environment which you left behind. The University environment is different in terms of freedom, lifestyle, and, of course the academic pursuit which is your main reason for being at 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 objective.

The Handbook covers a wide range of areas which touch almost all aspects of your study and stay at 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 (Agricultural) programme.

The core values of the University introduce you from the onset, the nature of the new environment you find yourself and the governing the operation of that environment. You are required to know them well. The philosophy, aims and objectives of the programme are also very clearly specified. 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 resolved to make the best use of the opportunity. As for graduation requirements, those of you admitted on the basis of unified tertiary matriculation examination (UTME) results are required to obtain a minimum of 196 credits before you

graduates while direct entry (DE) students must obtain 166 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 (Agricultural) programme which contains the course outline and course description. It is mandatory for you to familiar yourself fully with them.

This handbook, as pointed out earlier, is produced and distributed to you with the sole aim of guiding you and directing you to do what is right and appropriate in the course of your academic pursuit here at the 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 successful, peaceful, and pleasant stay at Bayero University, Kano-Nigeria. You should always bear in mind that degree is awarded based on **character** and **learning**.

Wishing you best of luck.

Engr. Dr. Nuraddeen Mukhtar Nasidi,
Head of Department

SECTION ONE

1.0 INTRODUCTION

The Department of Agricultural Engineering was established in 2001/2002 session. The Department began academic activities with fifteen (15) undergraduate students and three (3) members of staff. The Senate of the Bayero University, Kano-Nigeria approved the change of the departmental name from agricultural engineering to agricultural and environmental engineering in its 345th meeting of July, 2016. The Department of Agricultural and Environmental Engineering is a medium size Department with experienced teaching and non-teaching staff, offering undergraduate and postgraduate degree programmes. Teaching is strongly informed by research, particularly in the final year where specialist options are taught. Research activities in the Department cover all the mainstream fields of Agricultural and Environmental Engineering, organised into groups: farm power, machinery and automation, soil and water conservation engineering, food processing and storage engineering. The aim of establishing the Department was to meet the growing need for manpower in the profession. The main objective was to train and produce Engineers with the required qualities and capabilities to meet the increasing need for professional Engineers in the country. 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 Agricultural and Environmental Engineering ensures that in addition to sound theoretical background students are thoroughly exposed to extensive and relevant laboratory experimentation and exercises.

1.1 CAREER AND JOB OPPORTUNITIES FOR AGRICULTURAL AND ENVIRONMENTAL ENGINEERING GRADUATES

When the knowledge of engineering and biological science is applied to agriculture, it is called agricultural engineering. Agricultural engineers are responsible for designing agricultural tools and equipment as well as machinery and plants. These engineers can either specialize in designing power and machine systems (for environmental or agricultural purposes) or be involved in food and bio-process. Soil and water conservation as well as agricultural processing are some of their concerns. Agricultural engineers may work in R&D operation or sales or management.

Agricultural and Environmental Engineers apply knowledge of engineering technology and science to agriculture and also put biological/environmental resources into efficient use.

Agricultural and Environmental Engineers design agricultural machinery, equipment, sensors, processes, soil and water conservation and structures. Some engineers specialize in areas such as power systems and machinery design; structures and environment engineering; and food and bio-process engineering. They work on ways to improve the processing of agricultural products. The global trend toward standardization of all agricultural products and equipment will lead to greater demand for agricultural engineers. The increasing demand for agro-products, the efforts toward attaining greater efficiency in the agricultural industry and the emphasis of conservation of scare resources would result in higher job opportunities in this sector. Also, additional jobs will be created by agricultural engineers who leave the profession due to retirement and transfers.

1.2 ORIENTATION

At the beginning of each new session, new students are welcomed to the departmental orientation day (DOD), which usually last for a whole day. A lot of activities are arranged to familiarize the students with the new environment and the University system. Such activities include addresses by the Dean, HODs, members of staff, and University Officials such as, the Librarian; Director, Security Division; Director, University Health Service; etc.

1.3 LIST OF PAST HEADS OF DEPARTMENT

Below is the list of the past Heads of Department

S/N	NAME	FROM	TO
1.	Engr. Prof. Abdu Salihi	January, 2001	May, 2003
2.	Engr. Habib Imam Ahmad	June, 2003	December, 2010
3.	Engr. Dr. Ibrahim Ahmad Rufa'i	January, 2011	February, 2011
4.	Engr. Prof. Mohammed Abdulkarim Ali	February, 2011	March, 2015
5.	Engr. Dr. Muhammed Shu'aibu Abubakar	March, 2015	March, 2019
6.	Engr. Dr. Muhammed Lawal Attanda	March, 2019	February 2022
7	Engr. Dr. Sarafaddeen Kolawole Shittu	February 2022	December 2024

1.4 STAFF LIST OF THE DEPARTMENT

Below is the current list of staff in the Department of Agricultural and Environmental Engineering.

A. ACADEMIC STAFF

7	STAFF NAME	QUALIFICATION	RANK
1	Engr. Dr. N. M. Nasidi	B.Eng, (BUK), M.Sc, (ABU), PhD (UPM), MNIAE, R Eng (COREN)	Senior Lecturer (HOD)
2	Engr. Prof. M. S. Abubakar	B.Eng, M.Sc, (UNIMAID), PhD, (UPM), MNIAE, MNSE, R Eng (COREN)	Professor
3	Engr. Prof. M. L. Attanda	B.Eng, M.Sc, PhD, (ABU), MNIAE, MNSE, R Eng (COREN)	Professor
4	Engr. Prof. M. M. Maina	B.Eng, (UNIMAID), M.Sc, (FUT, MINNA) PhD, (UPM), MNIAE, MNSE, R Eng (COREN)	Professor
5	Engr. Prof. D. D. Nalado	B.Eng, M.Sc, PhD, (ABU), MNIAE, MNSE, R Eng (COREN)	Professor
6	Engr. Dr. S. K. Shittu	B.Eng, (ABU), M.Sc, (UNIMAID), PhD, (ABU), MNIAE, MNSE, R Eng (COREN)	Professor
7	Engr. Dr. R. F. Jahun	B.Eng, (ABU), M.Eng (ATBU), PhD (SAU), R Eng (COREN)	Assoc. Professor
8	Engr. Dr. M. M. Bello	B.Eng, (BUK), M.Sc, (UPM), PhD (UM), MNIAE, R Eng (COREN)	Assoc. Professor
9	Engr. H. I. Ahmad	B.Eng, M.Sc (ABU), FNIAE, MNSE, R Eng (COREN)	Senior Lecturer
10	Engr. Dr. N. J. Shanono	B.Eng, (BUK), M.Sc (ABU), PhD (WITS), MNIAE, MNAHS, MASABE R. Eng (COREN)	Senior Lecturer
11	Engr. M. D. Zakari	B.Eng, M.Eng (BUK), MNIAE, R Eng (COREN)	Senior Lecturer
12	Engr. M. N. Yahya	B.Eng, (BUK), M.Sc, (UK), MNIAE	Senior Lecturer
13	Engr. Dr. A. I. Muhammad	B.Eng, M.Eng (BUK), PhD (ZU), MNIAE	Senior Lecturer
14	Engr. Dr. R. K. Ahmad (Mrs)	B.Eng, M.Eng (BUK), PhD (UTP), MNIAE	Senior Lecturer
15	M. A. Tadda	B.Eng, (BUK), M.Sc, (UPM), MNIAE	Lecturer I
16	Engr. M. Mohammed	B.Eng, M.Sc, (ABU), MNSE, R Eng (COREN)	Lecturer I
17	Engr. Dr. I. Lawan	B.Eng, M.Eng (BUK), PhD (FAFU), MNIAE	Lecturer I
18	A. Shitu	B.Eng, (BUK), M.Sc, (UPM), MNIAE	Lecturer I
19	Engr. A. Ibrahim	B.Eng, (BUK), M.Sc, (UPM), MNIAE, R Eng (COREN)	Lecturer I
20	Engr. U. Muhammad	B.Eng, M.Eng, (BUK), MNIAE, R Eng	Lecturer I

		(COREN), MIENG	
21	Engr. I.M.T. Usman	B.Eng (BUK), M.Sc (UoSurrey), MNIAE, R Eng (COREN)	Lecturer I
22	Engr. A.N. Jibril	B.Eng (BUK), M.Sc (), MNIAE, R Eng (COREN)	Lecturer I

B. TECHNICAL STAFF

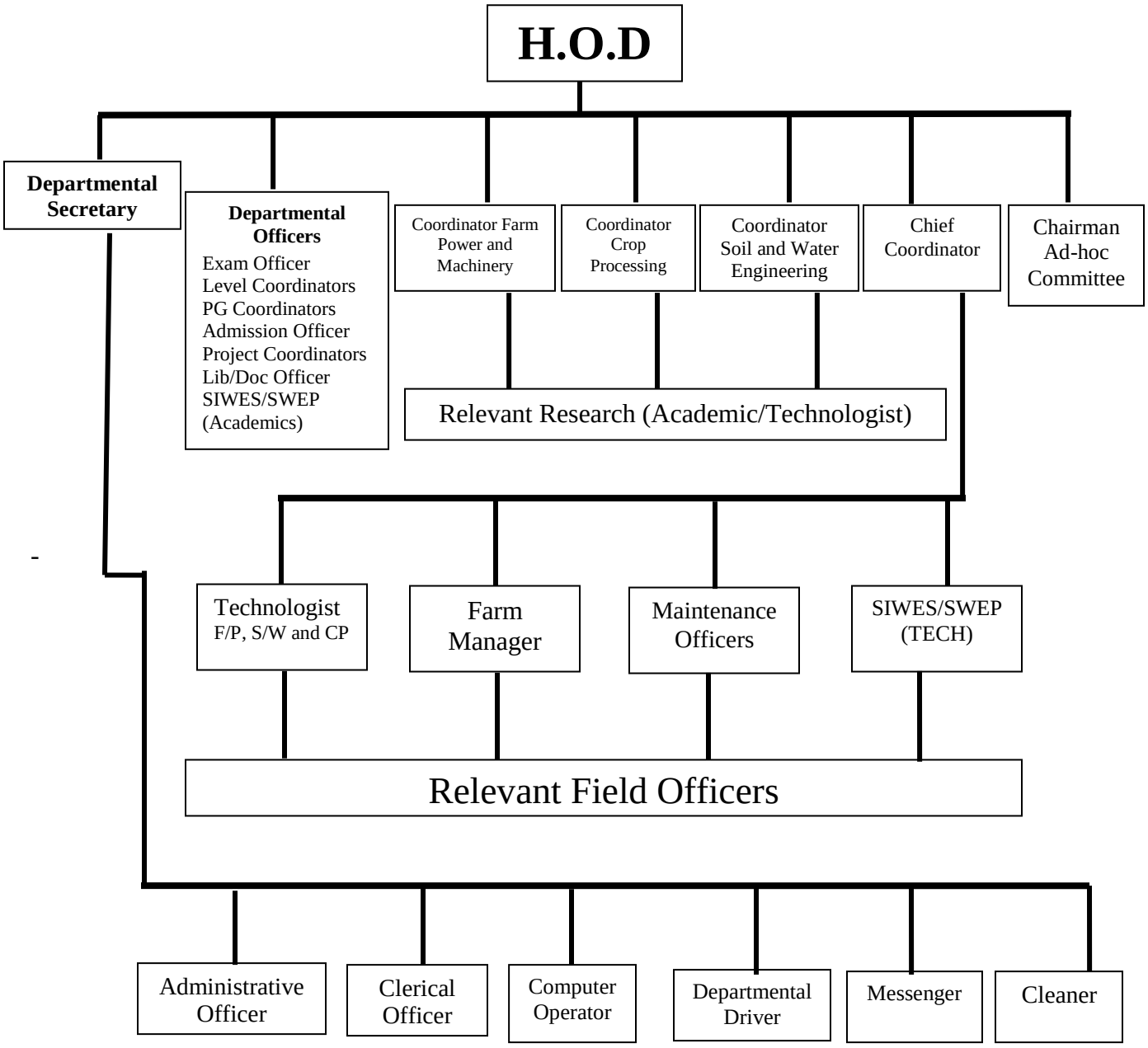
S/N	STAFF NAME	QUALIFICATION	RANK
1	I. S. M. Karaye	OND, HND, PGDAE, (Agricultural Engineering)	Chief Technologist
2	M. S. Adamu	OND, HND, (Agricultural Engineering), PGDAE, (BUK)	Chief Technologist
3	B. Yahaya	OND, HND (Agricultural Engineering)	Assist. Chief Technologist
4	A. A. Abubakar	OND, HND, PGD (Agricultural Engineering)	Assist. Chief Technologist
5	L. A. Zubair	BEng. Irrigation Engineering (BUK)	Principal Technologist
6	I. Abubakar	B. Eng. (BUK), MSc. (BUK)	Senior Technologist

C. ADMINISTRATIVE AND JUNIOR FIELD STAFF

S/N	STAFF NAME	QUALIFICATION	RANK
1	M. M. Abdullahi	SSCE, B. Ed. Lib Inf. Sci. (ABU)	Clerical Officer (Admin)
2	Yusuf Umar	Trade Test I	Tractor Driver
3	Bashir Abbas	SSCE	Tractor mate
4	Dahiru Maikano	First Sch. Leaving Certificate, and SSCE	Tractor Driver
5	Nasiru Sa'ad Bello	SSCE, ND, HND	Asst. Lab Attendant
6	Garba Ningi	Junior Sec. Sch. Certificate	Animal Field Attendant
7	Jazuli Sabo Gantsa	First Leaving Certificate	Animal Field Attendant
8	Haruna Shehu	Nil	Messenger/Cleaner

1.5 ORGANOGRAM FOR THE DEPARTMENT

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 students welfare. The hierarchical illustration of the organisational chart of the Departmental Administration is as shown in Figure below.



1.5.1 Departmental Board of Studies (DBS)

The departmental board of studies (DBS) 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.

1.5.2 Departmental Board of Examiners (DBE)

The departmental board of examiners (DBE) 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.

SECTION TWO

2.0 BRIEF HISTORY OF THE DEPARTMENT

The Department of Agricultural Engineering was established in 2001/2002 session when the first set of students was admitted into Level 100 of the 5-year Bachelor of Engineering (Agricultural) degree programme. Courses in Levels 100 and 200 are common courses for all Faculty of Engineering students. In 2016, Senate, at its 345th meeting, approved the change of the department's name from the Department of Agricultural Engineering to the Department of Agricultural and Environmental Engineering. Presently, the Department has graduated eight (8) sets of students from 2007/2008 to 2015/2016. The Department is adequately equipped in the following laboratories namely: Farm Power and Machinery, Soil and Water Engineering (Hydrology and Hydraulic, Soil Mechanics), Processing and Storage Engineering, Basic Agricultural Engineering Practice Workshop. The Department had started running Postgraduate Programmes in the 2011/2012 session. The programmes run by the department consist of the followings:

1. Bachelor of Engineering (BEng. Agricultural)
2. Postgraduate Diploma in Agricultural Engineering (PGDAE)
3. Masters in Agricultural Engineering (With options in Farm Power and Machinery, Soil and Water and Processing and Storage)
4. PhD in Agricultural Engineering (With options in Farm Power and Machinery, Soil and Water and Processing and Storage)

2.1 PHILOSOPHY OF THE PROGRAMME

To achieve the national goals and objectives on Industrialization and Self-reliance, the programme is geared towards:

i. The development of a thorough practice in engineering and technology training.
ii. Broad-based training in general engineering and technology at the early stages of the programmes.
iii. Practical application to engineering, technology and manufacturing processes.
iv. Adequate training in human and organizational behaviour and management.
v. Introduction to entrepreneurial education and training.
vi. Close association of the programme with industries in the country.

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 especially Agro-allied and the community in general.

2.2 AIMS AND OBJECTIVES OF THE PROGRAMME

The general aims and objectives of the programme are 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:

i. To design relevant engineering projects and supervise their construction, evaluation and implementation.
ii. To design and implement new components, machines, equipment and systems.
iii. To design and develop new components, machines, equipment and systems.
iv. To install and maintain complex engineering systems so that they can perform optimally in our environment.
v. To adapt and adopt exogenous technology in order to solve local engineering problems.
vi. To be able to exercise original thought, have good professional judgment and be able to take responsibility for the direction of important tasks.
vii. To be able to manage people, funds, materials, and equipment.
viii. To improve on indigenous technologies so as to enhance local problem-solving capability.

2.3 Program Educational Objectives (PEOs)

The Programme Educational Objectives (PEOs) of the Agricultural and Environmental Engineering Programme of the Department of Agricultural and Environmental Engineering, Bayero University Kano, ensure that Agricultural and Environmental Engineering graduates working in the engineering field reflect the Agricultural and Environmental Engineering graduate attributes below:

1. **PEO1**: Produce competent professionals who are committed to addressing African developmental challenges through the application of scientific knowledge and technological experiences.
2. **PEO2:** To provide Engineers with the ability for creativity, innovation, problem-solving skills, and entrepreneurship capable of competing in a dynamic world.
3. **PEO3**: To prepare graduates to effectively practice as professional engineers, managers, and leaders in the Agro-allied industries and other relevant fields.
4. **PEO4**: To lead in cutting-edge research and advancement of agricultural and environmental engineering education in line with Sustainable Development Goals.
5. **PEO5**: To mentor and instill the Agricultural and Environmental Engineering discipline in aspiring individuals to unleash their potential and realize their dream of becoming technocrats in building Africa.

2.4 Programme Outcomes (POs)

Agricultural Engineering programme has defined 11 program objectives (POs) that are aligned with the ii graduate attributes (GAs) prescribed COREN.

PO1	**Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of developmental and complex agricultural engineering problems
PO2	**Problem Analysis:** Identify, formulate, research literature and analyse developmental and complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and agricultural engineering sciences
PO3	**Design/Development of Solutions:** Proffer solutions for developmental or complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations
PO4	**Investigation**: Conduct investigation into developmental or complex problems using research-based knowledge and research methods, including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid

	conclusions
PO5	**Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and ICT tools, including prediction, modelling and optimization to developmental and complex engineering activities, with an understanding of the limitations
PO6	**The Engineer and the World:** Apply reasoning informed by contextual knowledge, including Humanities and Social Sciences, to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice
PO7	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice, including adherence to the COREN Engineers' Codes of Conduct
PO8	**Individual and Collaborative Team Work**: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings
PO9	**Communication**: Communicate effectively on developmental or complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO10	**Project Management and Entrepreneurship:** Demonstrate knowledge and understanding of engineering, management and financial principles and apply these to one's own work as a member and leader in a team to manage projects (including product commercialization) and in multidisciplinary environments
PO11	**Lifelong Learning:** Recognize the need for, and have the preparations and ability to engage in independent and lifelong learning in the broadest context of technological and social changes

2.5 ADMISSION REQUIREMENTS

Candidates seeking admission into the Agricultural and Environmental Engineering can be admitted at the 100 or 200 level as follows:

Level 100: Candidate must possess the Secondary School Certificate Examination (SSCE), West African Examination Council Examination (WAEC), National Examination Council (NECO) or equivalent with a minimum of credits in at least five subjects (including Mathematics, English,

Chemistry, Physics, and any other science subject) all obtained at not more than two sittings. This is in addition to the above, an acceptable performance in the Unified Tertiary Matriculation Examination (UTME) in the relevant subjects which include Physics, Chemistry, Mathematics and English Language and an acceptable pass in the Bayero University Kano's post-UTME examination.

Level 200 (Direct Entry): Candidates must possess a minimum of ten (10) points in GCE Advanced Level/IJMB or equivalent in Physics, Chemistry and Mathematics in not more than one sitting. Or possess a National Diploma in Agricultural Engineering or equivalent with a minimum of Upper Credit. This is in addition to having the Secondary School Certificate Examination (SSCE), West African Examination Council Examination (WAEC), National Examination Council (NECO) or equivalent with a minimum of credits in at least five subjects (including Mathematics, English, Chemistry, Physics, and any other science subject) all obtained at not more than two sittings.

2.6 DURATION OF THE PROGRAMME

The minimum duration of the programme is five academic sessions for candidates who enter with Senior Secondary School Certificate or GCE 'O' Level or equivalent qualifications and UTME. Candidates admitted through Direct Entry shall spend a minimum of four academic sessions provided that they satisfy all the other University requirements.

2.7 GRADUATION REQUIREMENTS

All courses in Levels 100–400 are compulsory. In the final year (Level 500), students are required to register for all the core courses and 12 credits (6 credits in each semester) of optional/electives. To be eligible for the award of a degree, a student must pass a minimum total of credit units depending on programme entry point as follows:

(i) Level 100 (UTME) entry point 196 credit units

(ii) Level 200 (DE) entry point 166 credit units

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

2.8 ACADEMIC REGULATIONS

2.8.1 Academic Atmosphere

The Department encourages and supports conduct of and participation in seminars, workshops and conferences within and outside the Country. Students are encouraged to participate in various academic programmes relevant to their discipline.

2.8.2 Semester System

The Department, in line with the University Regulation operates a semester system which is defined as a quantitative organization of the curriculum where courses are divided into examinable units and for which a student earns credit if passed. The courses are arranged in a well-defined order that indicates the credits load as well as the semester in which they are taken.

2.8.3 Basic Concepts

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.

2.8.4 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.

2.8.5 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).

2.8.6 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:

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

Where;

TCR = Total Credits Registered

TCE =Total Credits Earned

2.8.7 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.

2.8.8 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.

2.8.9 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.

2.8.10 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.

2.8.11 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.

2.8.12 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.

2.8.13 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.

2.8.14 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.

2.9 GRADING OF STUDENTS' WORK

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. Only final year project is graded over 100% without any written examination. But each course taught is graded out of maximum of 100 marks (made up of continuous assessment and written Examination) and assigned appropriate Grade point Equivalent as follows:

The Current Grading System		
Score	**Letter Grade**	**Grade Point**
70-100%	A	5
60-69%	B	4
50-59%	C	3
45-49%	D	2
40-44%	E	1
00-39%	F	0

2.10 DEGREE CLASSIFICATION SCHEME

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

Current Degree Classification Scheme	
Class of Degree	**CGPA**
First Class Honours	4.50 - 5.00
Second Class Upper Honours	3.50 - 4.49

Second Class Lower Honours	2.40 - 3.49
Third Class Honours	1.50 - 2.39
Pass	1.00 – 1.49

2.11 COURSE STRUCTURE

The Department of Agricultural and Environmental Engineering has adopted a course unit (Semester) system in the five year degree programme as follows: In Levels 100 and 200 all Engineering students in the Faculty take the same courses. These are considered to be preparatory/basic engineering courses. A level 100 student is expected to register for 34 credits, including 4 credits of GSP course. A level 200 student is required to register for 43 credits including GSP courses and SWEP. 300 students must register and pass 4 credits course of Entrepreneurship Education (EEP). In Levels 300, 400 and 500 students must register for a minimum of 18 credit units per semester. The long vacation (8 weeks) at the end of Level 200 is spent on the campus to expose students to practical work in the Students Work Experience Programme (SWEP). Also during the long vacation at the end of Level 300 students spend 8 weeks on attachment with industries on the SIWES I. At the end of the first semester of Level 400, students embark on six months of industrial training (SIWES II).

2.11.1 COURSE CODIN

Each course in the Department is identified by a seven character code of which the first three characters identify the programme, example AGE (for Agricultural and Environmental Engineering). The last four characters in a course code are numeric. The first digit designates the level (example ‘5’ for level 500, etc). The second digit designates the credit hours for the course. The last two digits designate the course serial number. For example the course code AGE5301 represents an Agricultural and Environmental Engineering course (AGE) for level 500, with 3 credit hours which is serially numbered as No. 01.

2.11.2 COURSE OUTLINE

LEVEL 100 COURSES
FIRST SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-requisite
1	CHM1231	Inorganic Chemistry	2	Core	
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 Practicals I	1	"	
7	PHY1210	Mechanics	2	"	
8	PHY1220	Electricity and Magnetism	2	"	
9	GSP1201	Use of English	2	"	
Total Credits			**19**		

SECOND SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-requisite
1	CHM1251	Physical Chemistry	2	Core	
2	CHM1261	Practical Chemistry	2	"	
3	MTH1302	Elementary Mathematics II	3	"	
4	MTH1303	Elementary Mathematics III	3	"	
5	PHY1180	Physics Practicals II	1	"	
6	PHY1230	Behaviour of Matter	2	"	
7	GSP1202	Use of Library, Study Skills and ICT	2	"	
Total Credits			**15**		

LEVEL 200 COURSES

FIRST SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-requisite
1	EGR2204	Workshop Practice	2	Core	
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**		

* For Direct Entry Students only

SECOND SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-requisite
1	EGR2101	Engineer in Society I	1	Core	
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	"	PHY1220
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

LEVEL 300 COURSES
FIRST SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-Requisite
1	EGR3101	Engineer in Society II	1	Core	EGR2101
2	EGR3301	Engineering Mathematics III	3	"	EGR2301
3	MEC3204	Fluid Mechanics II	2	"	EGR2202
4	MEC3301	Solid Mechanics II	3	"	EGR2201
5	AGE3211	Machine Component Drawing and Design	2	"	EGR2203
6	AGE3212	Engineering Metallurgy	2	"	
7	AGE3213	Introduction to Agricultural and Environmental Engineering	2	"	
8	AGE3214	Soil Science for Agricultural and Environmental Engineers	2	"	
9	AGE3215	Geology for Agricultural and Environmental Engineers	2	"	
10	AGE3216	Laboratory I	2	"	
11	AGE3311	Agricultural Land Surveying	3	"	
Total Credits			**24**		

SECOND SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-Requisite
1	EGR3102	Technical Writing and Presentation	1	Core	
2	EGR3203	SIWES I	2	"	
3	EGR3302	Computational Techniques	3	"	EGR2302
4	EGR3311	Computer Application	3	"	EGR2313
5	MEC3207	Mechanics of Machine I	2	"	
6	AGE3217	Agricultural Waste Management	2	"	
7	AGE3218	Laboratory II	2	"	
8	AGE3312	Animal Production for Agricultural and Environmental Engineers	3	"	
9	AGE3313	Elements of Crop Production for Agricultural and Environmental Engineers	3	"	
10	EEP3201	Entrepreneurship and Innovation	2	"	
Total Credits			**23**		

SIWES I: Students Industrial Work Experiences Scheme I

LEVEL 400 COURSES
FIRST SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-Requisite
1	EGR4101	Engineer in Society III	1	Core	EGR3101
2	EGR4201	Engineering Statistics	2	"	EGR2302
3	AGE4211	Hydraulics	2		
4	AGE4212	Farm Management, Rural Sociology and Agricultural Extension	2	"	
5	AGE4213	Laboratory III	2	"	
6	AGE4311	Farm Power and Machinery	3	"	
7	AGE4312	Irrigation Practice and Drainage	3	"	
8	AGE4313	Hydrology	3	"	
9	AGE4314	Properties, Handling Processing and Storage of Agricultural Products	3	"	
10	AGE4315	Farm Structures and Environmental Control	3	"	
11	EEP4201	Entrepreneurship Venture Creation and Growth	2	"	
Total Credit			**24**		

SECOND SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-Requisite
1	EGR4401	SIWES II	4	Core	
Total Credits			**4**		

SIWES II: Students Industrial Work Experiences Scheme II

LEVEL 500 COURSES
FIRST SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-Requisite
1	AGE5211	Laboratory IV	2	"	
2	AGE5321	Agricultural Engineering Management	3	"	
3	AGE5322	Design of Agricultural Machinery	3		AGE4301
4	AGE5323	Irrigation Systems Engineering	3	"	AGE4302
5	AGE5324	Processing and Storage of Agricultural Products	3	"	AGE4304
6	****	Elective Courses	6		
Total Credits			**20**		

SECOND SEMESTER

S/N	Course Code	Course Title	Credit Unit	Status	Pre-Requisite
1	AGE5212	Agricultural Mechanization	2	Core	AGE4302
2	AGE5213	Land Clearing and Development	2	"	
3	AGE5325	Farm Electrification	3	"	
4	AGE5326	Soil and Water Conservation Engineering	3	"	
5	AGE5601	Final Year Project	6	"	
6	****	Elective Courses	6		
Total Credits			**22**		

2.11.3 ELECTIVE COURSE

Level 500 Students are expected to select two elective courses in each semester from the following options:

FIRST SEMESTER ELECTIVE COURSES
FARM POWER AND MACHINERY SPECIALIZATION

S/N	Course Code	Course Title	Credit Unit
1	AGE5327	Agricultural Power	3
2	AGE5328	Operation and Management of Farm Power and Machinery Systems	3
3	AGE5329	Agricultural Systems' Automation	3
4	AGE5330	Automotive Service and Maintenance	3

SOIL AND WATER ENGINEERING SPECIALIZATION

S/N	Course Code	Course Title	Credit Unit
1	AGE5331	Construction and Installation of Irrigation and Drainage Systems	3
2	AGE5332	Agricultural Land Drainage	3
3	AGE5333	Solid Waste Engineering and Air Pollution	3
4	AGE5334	GIS Application to Agriculture	3

PROCESSING AND STORAGE SPECIALIZATION

S/N	Course Code	Course Title	Credit Unit
1	AGE5335	Renewable Energy Application to Agriculture	3
2	AGE5336	Food Engineering	3
3	AGE5337	Engineering Properties and Handling of Agricultural Materials	3
4	AGE5338	Farm Transportation	3

SECOND SEMESTER ELECTIVE COURSES
FARM POWER AND MACHINERY SPECIALIZATION

S/N	Course Code	Course Title	Credit Unit
1	AGE5339	Agricultural Machinery	3
2	AGE5340	Theory and Design of Tractor Engine	3

SOIL AND WATER ENGINEERING SPECIALIZATION

S/N	Course Code	Course Title	Credit Unit
1	AGE5341	Ground Water Technology	3
2	AGE5342	Operation and Maintenance of Irrigation and Drainage Systems	3

PROCESSING AND STORAGE SPECIALIZATION

S/N	Course Code	Course Title	Credit Unit
1	AGE5343	Storage of Fresh Fruits and Vegetables	3
2	AGE5344	Solar Energy Applications to Processing and Storage	3

Summary of credit unit per level requirements for Agricultural Engineering

Level	First Semester	Second Semester	Total
100	19	15	34
200	21 23*	22 24*	43 47*
300	24	23	47
400	26	4	30
500	20	22	42
Total			**196** **166***

*For Admission through Direct Entry (DE)

Minimum graduation requirement (MCR) for Agricultural Engineering

Component Courses	Total Credit Unit	
	Admission through UTME	**Admission through DE**
Core/Cognate	169	139
Industrial Training	07	07
Elective	06	06
General Studies	10	10
Entrepreneurial	04	04
TOTAL	**196**	**166**

However, a student can graduate with a minimum credit required (MCR) of 160 or 190 he/she fails 6 credits optional courses in final year, for DE or UTME admitted student as the case may be.

2.11.4 COURSE SYNOPSIS

CHM1231: 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.

CHM1241: 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, cycloalkanes; cis-trans isomerism, simple electrophilic addition reactions, polymerization.

CHM1251: Physical Chemistry (2 credits)

Principles of atomic structure; Isotopes, empirical and formular, 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; Thermochemistry, Enthalpy of reactions, bond energies, thermodynamic cycles, Hess's law Born Herber cycle, the meaning of Ka, 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 at which is attained. Factors influencing rate of reactions. Introduction to activation and catalysis.

CHM1261: 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 VictoMeyer 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 Moiver'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, bernooulli and continuity equations, turbulence, streamlines, bermooulli and continuity equations, turbulence; Reynold's number. Viscosity; laminar flow, Poiseulle'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 Practicals 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, Poision, hypergeometric and normal distributions. Expectations and moment, random variables; probability sampling from table of random numbers; selected applications.

EGR2101: Engineer in Society I (1 credit)
Historical Background: The development of engineering as the response to the increasingly complex problems of the individual, the community and society. Significant EGRhnological discoveries which have affected the progress of civilization. The industrial revolution and the harnessing and exploitation of various fuel sources: coal, oil, and generation of electricity, nuclear power and renewable sources (solar energy, wind power, etc). The impact of engineering activities on the environment and its resources. The Engineering Profession. The evolution of the different branches of engineering, and the structure, organization and ethics of the professions, the specific responsibilities to society of the civil engineer, Electrical Engineer, and the Mechanical Engineer. Other engineering disciplines and their interrelationships; multi-disciplinary projects. The contrast between the Engineer and the Scientist, and the engineering approach to the solution of practical problems. Engineering Projects: The role of engineering activities and industry in the nation's economy. Introduction to economics, management

and law as relating to engineering and industrial practice. The planning, construction and operation of engineering projects and facilities. NOTE; Films and seminars by practicing engineers will comprise part of the above lecture course, which will also be supplemented by work visits to illustrate the major branches of engineering as far as local opportunities allow.

EGR2102: SWEP (1 credit)

EGR2103: Experimental Methods and Analysis (1 credit)
Principles of measurement, standard deviation, method of least squares and its application. Curve fitting, Theory of errors. Binomial 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 system. Dynamic response.

EGR2201: Fluid Mechanics I (2 credits)
Properties of Fluids: Characteristics of liquids, mass 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 hydroastatic pressure on plane and non-plane surfaces; forces on floating and immersed objects; stability and height. Fluid in Motion: Definition: Steady, unsteady, uniform and non-uniform flow; steady, unsteady, uniform and non-uniform flow; velocity distribution and discharge; the concepts of a fluid particles; streamlines and streamtube. The continuity (conservation of mass) equation. The energy (Bewrnoiulli's) equation for incompressible steady flow: applications to orifices, nozzles, venturi meters, Pilot 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 pipe appurtenances. Introduction to flow in open channels: the Chezy formula.

EGR2202: Solid Mechanics (2 credits)
Fundamentals of equilibrium. Statical determinacy with reference to pin-jointed frames. Force analysis of pin-jointed plans 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 poisson'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 draughts-manship 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 areas; oblique (cavelier and cabinet) 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)

Workshop Hazard. Hand processes and bench work. Joining and Fastening, Welding, Hand tools, Measurement Systems and devices, marking out, Sheet 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 filling exercise, Manufacture of a simple bolt, Construction of a simple amplifier, Exercise in battery maintenance and charging. Cement and concrete preparation 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.

EGR2206: Materials Science I (2 credits)

Structure of the Solid State: Review of the theory and structure of the atom; Primary and secondary bonds in solids. Crystalline solids; Common crystal structures in elements; Miller notation for crystallographic planes and directions; Crystal defects: Point defects (vacancy, substitutional and interstitial stems.); Line defects (dislocations); Plane defects (grain boundaries). Single-Phase and Multi-phase Materials: Solid solutions and intermediate phases; Equilibrium diagrams; Some important commercial alloy systems. Deformation in Solids: Elastic deformation, plastic deformation and motion of dislocations; Properties of Materials: Mechanical properties; Thermal properties; Electrical properties; Magnetic properties; Optical properties.

EGR2207: Principles of Electrical Engineering I (2 credits)

Fundamentals of Electrical Engineering: Electric Current. Coulomb's Law. Potential difference. Faraday's law of Electromagnetic induction. Chm's law. Kirchhoff's Laws. Ampre's Law. Circuit Elements: Energy and Power. Resistance. Capacitance and Inductance parameters. Circuit Elements in practice. Construction, materials, colour-code and preferred values. Series and parallel combination of resistors, capacitors and inductors Series-parallel circuits. Elementary Network Theory: Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Newwork Analysis by Mesh Current and Node par voltages Conversion of voltage sources to current source. Network reduction by Daslta-star (D-Y) transformations. Steady State Sinusoidal Response: Sinusoidal Functions. 1 stantenous and average power. Power Factor. Phasor Representation of sinusoikds. Sinusoidal Steady State Response of single elements. R-I, R-C, and R-I-C Circuits. Applications Network Theorems to complex impedances. Balanced three phase circuits. Semi-Conductor Devices: Conductors. Insulators and Semi-conductors. Conduction in Semi-Conductors. Types of semi-conductors. Charge carrier density in Semi-conductors. Semi-conductor Diodes-characteristic and Equivalent Circuits. The Diode Equation. Zener Diode, Tunnel Diodes. Varicap Diodes, Schottky (Hot Carrier) Diodes (LEDds), Liquid Crystal Displays (LCDS). Junction Transistors: Transistors Characteristics. C.B., CE and CC

configurations. Transistors biasing, the operating point, load line, stability factors, design of DC bias circuits, photogransistors. Introduction to Measurement: Units and standards. Direct and comparative measurements. Analogue and digital Measurements. Measurements of Current, voltage, resistance, capacitance and inductance.

EGR2208: Principles of Electrical Engineering II (2 credits)

Electromechanical Energy Conversion: Magnetic theory and circuits. Permeability magnetic flux, magnetic field intensity, derived relationships. Theory of magnetism. The magnetic circuit, concepts and analogies. Units for magnetic calculations. Magnetic circuit computations. Hysteresis and Eddy Current Loss. Transformers: Theory of operation and development of phase, the equivalent circuit, parameters from no-load tests. Efficiency and voltage regulation; mutual inductance. Basic Analysis of Electromagnetic Torque: Analysis of induced voltages. Construction features of electric machines. Practical form of torque and voltage formulae. Single Phase Motors: Types, principles of operation. Characteristics and typical applications. Three-Phase Induction Motor: The revolving magnetic field. The induction motor as a transformer, the equivalent circuit. Computation of performance Torque-speed characteristics. Three Phase Synchronous Machine: Generation of a three phase voltage system. Synchronous generator-phase diagram and equivalent circuit. The synchronous motor. Synchronous motor -operator diagram and equivalent circuit. Computation of performance. Applications. D.C. Machines D.C. generator analysis, D.C. motor analysis, motor speed torque characteristics, speed control. Application. Starters.

EGR2301: Engineering Mathematics I (3 credits)

Vector and matrix algebra: Basic definitions and operations. The inverse of a non-singular matrix. Theory of linear equations, Eigenvalue and eigen-vectors. Consistency dependence, and solution of simultaneous linear equations (including craner's rule). Analytic geometry: Coordinate transformation, solid geometry, polar cylindrical and spherical co-ordinates, curves and surfaces, plane curves and quadric surfaces. Multivariable calculus: Vector functions, continuity and derivatives, Elementary partial differentiation, multiple integrals. Various applications including maxima, minimum, volumes, tangent planes and normal lines.

EGR2302: Engineering Mathematics II (3 credits)

Vector analyses: Vector theory, dot product, cross product, vector fields, line and surface integrals. Grad. Div, and curl. Green's and stoke's theorems. Series and sequence: Basic definitions. Tests for convergence. Power series and Taylor's expansion of various elementary functions. Complex number, their representation and algebra. Fourier series.- Eular coeff; even and odd functions; sine and cosine functions. Calculus: Complex analysis. Elements of complex algebra, trigonometric, exponential and logarithmic functions. Analytic and harmonic functions. Integration of complex variables, cauchy theorem. First order equations, special types of second order equations.

EGR2304: Laboratory A (3 credits)

Engineering laboratory practical covering courses taught during the first semester of 200 level

EGR2305: Laboratory B (3 credits)

Engineering laboratory practical covering courses taught during the second semester of 200 level

EGR2306: Applied Mechanics (3 credits)

Statics: Laws of statics; System of forces and their properties; Application and simple problem. Friction and its applications: Nature and types of friction; Application of friction in machines-wedges,

Belt drives, screws and simple problems. Virtual Works: Works principle of virtual work; Application and simple problems Particle Dynamics, Kinematics of plane motion, Kinetics of particles (equation of motion, momentum and energy method); Kinematics of Rigid Bodies; Types of rigid bodies; Velocity and acceleration diagrams for simple mechanisms; Kinetics of rigid bodies; Two dimensional motion of rigid bodies, Energy and momentum. Moment of inertia and simple problems. Simple harmonic motions

EGR2313: Computer Programming (3 credits)

Introduction to Programming Languages. Operating Systems (DOS & Windows). Introduction to Microsoft DOS: Copy, Delete, Dir, MD, RD commands etc. creation of Batch files. AUTOEXEC. BAT and CONFIG. SYS files Windows Desktop (Taskbar, Start a program, Switch between running programs, Opening a file or folder, copy a file or folder, create a folder, change the name of a file or folder, Searching for files, back up your files. Customizing Windows Desktop (change the background of the desktop, change the ways items on the desktop look, set up a screen saver, to show all files and file name extension, to add a program to the Start or Program menu) Using Windows Accessories (Calculator, Games, Notepad, Entertainment, Using scandisk, Multimedia. The Concept of a Program, Preparation, Execution. Algorithms, Flow Charts and Pseudocodes (3 hrs). Elements of Fortran: (24 hrs). Characters, symbolic names, types of variables, Arithmetic expressions, Logical expressions, assignment. Control within a program unit: Simple loops, logic IF, unconditional transfer, (GO Assigned GO To). Arrays: Types of arrays, subscripts, simple functions, basic external functions, statements functions. Function and subroutine subprograms: Functions subprogram, subroutine, subprograms, external, use and abuse of local variables and arguments. Common storage: Common statement, stacks, equivalence statement. Initialization: Data, Block Data, Characters. Input/output: Read, write, general, I/O list, format, FW.d, EW.d, DW.d, GW.d, IW, AW, Banks, Free-format input. Files: Formatted files, unformatted files, end file, REWIND and Backspace. Exercises: Numerical calculations; Solution of certain equations, numerical integration, vectors and matrices, linear equations. Introduction to PASCAL.

GSP1201/2201: Use of English (2 credits)
GSP1202/2202: Use of Library, Study Skills and ICT (2 credits)

GSP2204: Foundations of the Nigerian Culture, Government and Economy (2 credits)

The University general policy statement written in 1976 for the N.U.C. sets out its fundamental aims under five headings, of which two may be seen as particularly relevant to a general studies course in the area of the foundation of Nigerian Culture. These aims, which also define the objectives of this segment, are:

- To encourage students to come to grips with some of the moral and societal issues of contemporary life.
- To assist students to understand and promote the cultural heritage of the Savannah, the Nigerian and the African tradition. Now, if culture can be defined as man's capacity to understand and improve upon the reality of his circumstances, then it is co-extensive with life and the process of education. The dynamics of a culture engenders, in the lives of a people. Culture, in this sense, is a people's way of being in the world; it is their way of making the world their own culture therefore is an expression of human nature and human reality in both material and spiritual. Human nature finds its creative fulfillment in the constructs, which correspond to man's material and spiritual cultures. In order to come to grips with the problems of the modern world, a student must be able to incorporate into his general education his own cultural heritage. The thought here is that by recapitulating his past and his

cultural heritage he will become better adapted to life and more equipped to deal with the moral and societal issues of his contemporary life situations. The culture epoch and recapitulation, therefore, define the main objectives of this course. **The Theoretical Base:** Definition & scope of culture various views: An abstract term, undefined & unlimited in scope. Cultural Typology Style: The individualized totality of mental and spiritual manifestations of a community as in traditions, customs institutions, philosophies, laws, arts, language etc. Culture as an embodiment of all human institutions: politics religion etc. Pattern: The structure of meanings and the ethnic characteristics of a community. Cultural constructs: ideas, beliefs and symbolic representations. Factors involved in cultural interaction and stratification; trade, politics, religion and language Cultural zones and regions: territorial or communal. Ethnic community as the basic human entity and the substratum of culture; defined by specific set of nature conditions i.e. extra cultural circumstances, e.g. geographical, historical, social, psychological and spiritual etc. what determines cultural zones and regions? Special emphasis on geographical and/or environmental factors. Culture as the expressive phenomena by which extra cultural factors are translated into cultural phenomena; man the creator of culture. **Nigeria: Land and people:** Cultural zones: the savannah region; history and traditions of the Hausa States, Sayfawa states of Kanan and Borno. People of the Benue, Gongola valley and the rest of the middle belt. The forest and coastal zones: the Yoruba and the Igbo speaking people; the Kalabari, the Igbo etc. Cultural constructs and traditions. Interaction between the cultural zones of Nigeria. The trading net-work, Population movement and cultural diffusion. The growth of arts and crafts in the Savannah and the forest regions in historical perspective; pottery and iron work, archiEGRture and sculpture etc. Pre-colonial socio/political organizations: the Hausa states, Kanemi, Borno, the Jukun, tribal entities? **Major Cultural Influences in Nigeria:** The penetration of Islam in Nigeria: Process of Islamization and concept of Islamic Ideology. Interaction between Islam and indigenous customs and traditions. The Islamic concept of political state. Sokoto Caliphate: its goals and objectives Penetration of Christianity in Nigeria. Early missionary activities and growth of Churches Interaction between Christianity and local customs and traditions. The influence of foreign cultures on the Nigerian society. African personality: a cultural conception of personality. Personality as a (a) motivational structure, (b) behavioural structure and (c) situational structure. Attempts to retrieve the cultural identity. Islamic and Christian views. The impact of Westernization on indigenous norms. The transformation of political culture of the people of Nigeria. **Education and culture:** Interaction between culture and educational process: education and culture change. Education and social order: education and social change. **Culture and the Moral Order:** Traditional Nigerian norms of behaviour, more, folkways, customs, traditions and concepts of human relations. Islamic ethical and philosophical systems: law, political and social Organizations. Islamic view of education and moral development. Christian concept of moral development Moral education in Nigerian Schools: causes of delinquency, drug abuse and deviancy. **Nigerian Government and Economy:** The Following Words Aptly Summarized the Objectives of this segment of the General Studies Programme. An educated man was expected to have broad based knowledge of several fields of specialization. He was expected to deal with moral issues and value judgments confronting his society as well as those relating to his own economic pursuits and political behavior. He was then expected to relate such knowledge and value determinations to his contemporary social situation. Accordingly, the aim of this course is, first, to make students conscious of Nigeria as political and economic entity; second, to identify the problems and prospects of Nigerian government and economy, past as well as present, and, finally to acquaint them with the mechanics to safeguard and promote those values and ideals which gave Nigeria its identity as a nation. **Nigerian Government:** Political Background: (3 lectures): this section briefly introduces the students to the system of political relations among various components of the Nigerian Community during the pre-colonial and the colonial period: (a) The traditional setting;

(b) the theory and practice of colonial administration in Nigeria; (c) Colonialism and Neo-colonialism. Nigerian Nationalism and Independence Movement: (a) the socio-political origin of Nigerian Nationalism: 1945-60; (b) the politics of de-colonisation; (c) Nigerian Constitutional development. Politics during the past-independence period: (a) party system and political Alliances electoral process; (b) political behaviour: continuity and change. Military and Politics: (3lectures) (a) Intervention and Military Administration; (b) The Military and the Bureaucracy; (c) the military and the society. Political Culture & Political participation: (a) Nigerian political culture and political integration: Issues of national integration and political participation. (b) Culture and society: A cultural theory of society; culture as a social process. Factors involved in social classification. Classification and integration as the complimentary processes of the inner dialectic of culture. The Future: The new constitution and its implications. **Nigerian Economy:** Historical Background: (a) History and characteristics of the Nigerian economy in the pre-colonial period: the indigenous economic system. (b) Nigerian economy during the Colonial era: Dualism and the emergence of a "dependent" economy. Contemporary Political Economy: (5 lectures): (a) Crisis in the Agricultural sector; (b) industrialization programmes; (c) Education, man power and development; (d) Oil- wealth: Dilemma for development. Economic Planning: (a) Problems of economic planning in Nigeria: Anatomy of the three/five year development plans; (b) Regional planning; (c) Economic planning and social change. Prospects of the Nigerian Economy: Indigenization decree and the quest for economic independence; (c) The role of Nigeria in International Organizations; ECOWAS, UNCTAD, OPEC.

GSP2205: Logic and Philosophy (2 credits)

GSP2206: Peace Studies and Conflict Resolution (2 credits)

AGE3211: Machine Component Drawing and Design (2 credits)
Theory of Projections: Principles of projections: Projection of a point, line and plane figures, Projection of solid models, Intersection of lines, planes and solids and Axonometric projections. Part assembly: Detailed drawing of machine components: Sketching and use of drawing standards: Paper formatting, Lettering, Scale, Dimensioning and sectioning. Surface finish: Fits and Tolerance. Fasteners: Threaded fasteners, riveted joints and welded joints. Power transmission elements: conventional representation, detailed and assembly drawing of gears and gear trains. Introduction to computer aided drawing: Auto Card, Pro-engineer and Solid works.

AGE3212: Engineering Metallurgy (2 credits)
Metals and alloys: Ferrous Alloys and Non-ferrous alloys, Metals and alloys production and use, Engineering Properties of metals: Mechanical properties and thermal properties, Nature, origin and control of structure in metallic systems and their relation to mechanical properties: diffusion, deformation, hardening and transformation and Material Selection and design consideration.

AGE3213: Introduction to Agricultural and Environmental Engineering (2 credits)
Part A: Introduction to Agricultural and Environmental Engineering Profession. Identification of various tractors. Identification of other farm power sources. Types of farm implements. ***Part B***: Unit of Concentration: Mass concentration units, volume/volume and mole/mole units, using the ideal gas law to convert ppm to $\mu g/m^3$ and other type of units. Physical processes: Mass and energy balance. Biochemical Oxygen Demand (BOD), Chemical Oxygen demand (COD):

Definition of BOD, CBOD, DO and NBOD, sources of BOD, BOD kinetic and measurement of BOD.

AGE3214: Soil Science for Agricultural and Environmental Engineers (2 credits)
Part A: Origin and formation of soils, Physical properties of soils, Soil colloids, soil reaction, soil mineralogy, Soil organic matter, Soil survey and classification and Water movement in soils. **Part B:** Phase relationships, Shear strength, Consolidation, Settlement, Compaction, Machinery-soil-relationships, and Site Investigations.

AGE3215: Geology for Agricultural and Environmental Engineers (2 credits)
Introducing definition and relevance of geology to engineers (emphasis on Nigerians geology). The earth, Formation of rocks and minerals, surface geological processes-weathering erosion and decomposition, types of rocks, engineering properties of rocks, stereographical studies, stratigraphy, Geotechnics, Geomorphology, Mineralogy and petrology. Time scales-fossils and their importance. Application of geology to special engineering problems, for example, dykes, canals, dams, foundations, etc.

AGE3216: Laboratory I (2 credits)
Agricultural and Environmental Engineering Laboratory investigation/practical covering all theoretical courses taught during the first semester of 300 level.

AGE3217: Agricultural Waste Management (2 credits)
Definition, types of agricultural wastes; crops residue, Crop processing wastes, livestock wastes. Indicators of agricultural wastes; physical, chemical and bacteriological indicators. Agricultural waste management systems; green manuring, composting, incineration. Engineering properties of agricultural wastes; moisture content, relative humidity, density, angle of repose. Design of composting systems. Beneficial uses of livestock wastes; soil amendments, fuel, biogas, feeding wastes to animals. Design of biogas systems. Agro-allied industrial wastes; characterization of agro-allied wastes. Treatment systems for waste water from agro-allied industries; slaughter house wastes, brewery wastes, food and beverage wastes, textile wastes, intensive livestock farm wastes. The use of waste stabilization ponds; process design considerations, design of facultative, anaerobic and maturation ponds.

AGE3218: Laboratory II (2 credits)
Agricultural and Environmental Engineering Laboratory investigation/practical covering all theoretical courses taught during the second semester of 300 level.

AGE3311: Agricultural Land Surveying (3 credits)
Definition, measurement of distances. Use of minor instruments. Introduction to surveying instruments: Types, adjustments, Uses. Theory of Errors: Types, detection and elimination, Chain surveying, Bearing of lines, Leveling, Compass surveying, Plane table surveying, topographic surveys, triangulation, land shaping and earthwork, map reading, Tachometric, Trigonometric, Altimetry, Geometric and Theodolite Traversing. Photogrammetry, Aerial photography, Geographic Information Systems.

AGE3313: Animal Production for Agricultural and Environmental Engineers (3 credits)
Production of livestock (for eggs, milk, meat, wool etc.): Distribution of livestock in Nigeria. Animal feeding and nutrition; Forage crops and their preservation. Artificial insemination, Livestock housing and processing equipment.

AGE3314: Elements of Crop Production for Agricultural and Environmental Engineers (3 credits)
Classification and ecology of crops in Nigeria. Nutrient requirements and mineral nutrition of plants. Manures and fertilizers. Plant growth and development. Growth stages. Tillage and weed control. Other cultural practice. Cropping sequences and rotation. Farming systems. Production practices for specified crops.

EEP3201: Entrepreneurship and Innovation (2 credits)

EGR3101: Engineer in Society II (1 credit)
Basic Economics: Business organization, industrial combinations, public utilities and finance, industrial concentration and Government Control. The location of West African industry and trade. The background of the West African economy, planning of development, financing of development. The banking system, Money and Capital markets, inflation, cost benefit analysis.

EGR3102: Technical Writing and Presentation (1 credit)
Principles of effective communication. Professional use of the English language. Principles of technical writing. Oral presentation of technical ideas.

EGR3203: SIWES I (2 credits)

EGR3301: Engineering Mathematics III (3 credits)
Differential Equations: First order equations, special types of second order equations. Higher order linear equations with constant coefficients. Partial differential equations. Poisson's and Laplace's equation. Simple solutions, Legendre functions and Hermite functions. Application problems in heat transfer (parabolic equations), wave propagation (hyperbolic equation), steady-state (elliptic equation). Problems in different coordinate systems, boundary value problems. Laplace and Fourier Transforms.

EGR3302: Computational Techniques (3 credits)

Numerical analysis: Linear and non-linear equations. Finite differences operator. Flow diagrams and charts. Solution of simple algebraic and transcendent equations. Direct methods for the solution of linear equations. Iterative methods of matrix inversion. Numerical integration and differentiation – Newton coetes formulae. Introduction to linear programming. ***Polynomials and their zeros:*** methods of bisection, Newtown, Bairstow, synthetic division and Lehiner and Convergence. The Eigenvalue problem solution of ordinary differential equation, methods of Taylor, Euler, Predictor-corrector and Runge-Kutta.

EGR3311: Computer Applications (3 credits)

Programming techniques: Revision of operating systems and computer programming concepts, Algorithms, flow charts and pseudocodes. Programming languages, Revision of FORTRAN. Details of BASIC and introduction to PASCAL. *Introduction to Computer Usage:* Details of MSDOS. Creation of Batch files. The AUTO EXEC. BAT and CONFIG SYS. Files. ***Data Processing:*** Definition – Data, Metadata, Database, Files and Records. DBMS (Database Management System). Types of files. Import and Export, Details and application on DBASE. Introduction to Macro programming. ***Word*** Processing***:*** Definitions – WYSIWYG formatting, spell checking. Thesaurus and Mailing margins. Details and applications on MICROSOFT WORD or other approved Word Processor; Desktop Publishing including use of SCANNER and Laser Printer. ***Exercises:*** Programming techniques and numerical calculations: Introduction, sorting, Merging, Searching, Update, Horner's Method. Solution of certain Equations, Numerical Integration, Vector's and Matrices, Linear Equations, Graphing.

MEC3204: Fluid Mechanics II (2 credits)

Properties of real fluids: Viscosity, compressibility and elasticity. Surface tension and capillarity. Vapour pressure. Stresses in a vicious fluid. Relationship between stress and rate of strain. ***Flow of an Incompressible Fluid:*** *V*elocity and acceleration, steady and unsteady flows. One dimensional flow: Euler's equation, Bernoulli's equation. Two dimensional flows: Euler's equation, Bernoulli's equation. Navier Stokes equation. Newton's Second law of motion (control volume approach). Application of the impulse – momentum principles, Fluid flow in pipes. Fundamental equation. Friction factor. Pressure losses in pipes. Applications. ***Elementary Hydrodynamics:*** Streamline, stream tube and stream function. Basic flow fields. The velocity potential. Flow superposition.

MEC3207: Mechanics of Machines I (2 credits)

Mechanics: Acceleration in Mechanisms: Carioles component. Forces required to accelerate machine elements. Torque diagram. Flywheel. Cams. Governors. ***Power Transmission:*** Hookes Universal Joint. Friction clutch. Gearing systems. Spur/Helical Gears, Epicycle gearing. Gyroscopic effect and Euler's equations. ***Balancing of Machinery:*** Static and Dynamic balance. Reciprocating engine balancing. ***Friction and Lubrication:*** Dry friction, Boundary Lubrication. Film lubrication. Thrust bearings. Hydrostatic bearings.

MEC3301: Solid Mechanics II (3 credits)

Part A**:** Complex systems for stress and strain. Thermal effects and combined stresses. Mohr's circle for stress and strain. Theories of Elastic failure. Thick cylinders; Lame's theory, Force fits; Compound bending of thick curved beams; the Winkler theory. Unsymmetrical bending. Composite beams. ***Part B:*** Force analysis of statically indeterminate beams. Column and beam-column theory;

Euler columns and real columns. Introduction to energy methods of structural analysis, complementary energy and strain energy. Castigliano's and Engesser's theorems; the theorem of stationary complementary energy; potential energy; stationary potential energy; Rayleigh-Ritz method; approximate methods of solution.

AGE4211: Hydraulics (2 credits)
Fundamentals of fluid flow. Flow through pipes in parallel and in series, branched pipes, simple pipe network. Water hammer, open channel flow, critical velocity, flow measurement. Weirs, flumes, outlets, gates, valves, forces developed by moving fluids. Classes and types of hydraulic machinery: pumps, turbines etc. Reservoir hydraulics and planning.

AGE4212: Farm Management, Rural Sociology and Agricultural Extension (2 credits)
Application of basic sociological concepts to rural life. Management decision making. Functions of management planning, organization, staffing, directing and controlling. Financial management. Principles of Extension: diffusion, adoption and rejection of innovations. Communication and leadership in agricultural extension.

AGE4213: Laboratory III (2 credits)
Agricultural and Environmental Engineering Laboratory investigation/practical covering all theoretical courses taught during the first semester of 400 level.

AGE4311: Farm Power and Machinery (3 credits)
Introduction to farm power sources: internal combustion engines and their application to farm operations, Identification of various types of tractors, size and utilization. Selection and management of farm tractors and equipment. Tillage: primary, secondary and minimum tillage, Tillage equipment: ploughs, tillers, sub-soilers, harrows and cultivators. Force analysis and power measurement on tillage tools. Field performance evaluation of crop production equipment. Adjustment, maintenance and repair of tractors and implements, Identification of basic Irrigation and drainage structures, Simple Agricultural processing machines and their uses, Identification of common Agricultural produce storage structures. Visit to selected farm centres.

AGE4312: Irrigation Practice and Drainage (3 credits)
Development and scope of irrigation and drainage in Nigeria. Basic soil-water-plant relationship. Sources of irrigation water. Water requirements in irrigation systems. Methods of irrigation. Irrigation structures; conveyance, control, distribution and application. Frequency and scheduling of irrigation. Irrigation efficiency. Evaluating irrigation systems and practices. Design of furrow, basin and sprinkler irrigation. Types and methods of drainage. Effect of poor drainage on plants and soils. Drainage requirements of crops, surface drainage, sub-surface drainage.

AGE4313: Hydrology (3 credits)
Definitions. Components of hydrological cycle, their measurements and evaluation; solar and earth radiation, precipitation, evapotranspiration, infiltration. Rainfall runoff over agricultural land: Stream gauging, hydrographs, stream flow routing. Ground water and surface hydrology. Water shed management. Flood control.

AGE4314: Properties, Handling, Processing and Storage of Agricultural Products (3 credits)
Properties and characteristics of Agricultural materials: Determination of physical, mechanical and rheological properties, Thermal properties. Cleaning, sorting and grading. Handling methods: principles, description and selection of materials handling systems; pneumatic, screw, bucket and belt conveyors. Processing techniques. Crop drying. Crop storage.

AGE4315: Farm Structures and Environmental Control (3 credits)
Environmental and structural requirements of crops and livestock. Planning farm and farmstead; economic consideration. Environmental conditions in farm buildings: Ventilation, Humidity and temperature controls, cooling methods. Farm machinery shed. Livestock housing. Structures for storage of farm products and feeds. Care and maintenance of farm structures. Construction and maintenance of farm roads, water supply and sewage disposal systems. Use of pyschrometric charts. Farmstead planning and layout.

EEP4201: Entrepreneurship Venture Creation and Growth (2 credits)

EGR4101: Engineer in Society III (1 credit)
Law: A brief introduction to the following topics. The Nigerian Legal system. Industrial Safety Laws. Engineering Bye Laws. Electricity Supply Laws. Water and Public Health Laws. ***Company and Partnership Law:*** Nature and functions of companies. Formation and floatation of companies. Nature and type of partnership. Copyrights, Patents and Trademarks. The law relating to employers and employees Contract Law. Formation of contract. Discharge of Contracts. Remedies, Land acquisition law.

EGR4201: Engineering Statistics (2 credits)
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.

EGR4401: SIWES II (4 credits)

AGE5201: Laboratory IV (2 credits)
Agricultural and Environmental Engineering Laboratory investigation/practical covering all theoretical courses taught during the first semester of 500 level.

AGE5202: Agricultural Mechanization (2 credits)
Agricultural Mechanization: Nature and objectives of Agricultural Mechanization. Factors affecting mechanization in the tropics. Analysis of production systems. Agricultural Mechanization as a strategy for Rural development. Impact on food production and on Infrastructural development. Linkages with rural industrialization. Mechanization and environment. Case studies of selected farms. New concept of green economy, smart engine as new mechanization strategies use of renewable energy powered machine

AGE5203: Land Clearing and Development (2 credits)
Land resources. Land Use Act in relation to Nigerian Agriculture. Objectives, methods and equipment for Land clearing and development. Earth-moving machinery and their selection, mechanics of operation and vegetation types. Land reclamation. Earthmoving machinery and earthmoving mechanics.

AGE5301: Agricultural Engineering Management (3 credits)
Principle of management, industrial group and organization behavior, motive industrial law, Legislation on wages, trademarks and patents: law of contracts, sale of goods, liability for injuries, industrial relations, Trade unions employer associations, wage bargaining and the role of the state, Integrated approach to machinery usage and agricultural production sequence, Equipment selection, scheduling of operation, seasonality factor, machine management, machinery ownership and financing, gross margin, Optimization of machinery: input combination, management of farm or agro-based enterprise case studies. **Productivity*:*** Definition, factors affecting productivity in industry, how to increase productivity, measurement of productivity in industry. **Production Planning and Control*:*** Production control in intermittent manufacturing, production control in continuous manufacturing. Planning and controlling in project management – PERT. **Cost Data for Decision*:*** Fixed and variable costs, break-even analysis and construction of break-even chart. **Capital Costs and Investment Criteria:** Capital costs, common criteria of comparing economic alternatives, present value criteria, average investment criterion, rate of return, pay-off periods.

AGE5302: Design of Agricultural Machinery (3 credits)
Introduction: Definition, Classification of machine design, Machinery design processes, Design factors and procedures. **Materials of construction**: selection, strength properties and costing. **Mechanics of farm machinery**: Stress analysis and general design consideration of various farm machinery. **Design of machine elements**: Shafts, Belt drive, Chain drive, Gear drive, Couplings, Keys, springs, and Fasteners and connections. Machine fabrication, Failure Analysis, Design exercises relating to real engineering problems are to be undertaken by students, and Problems and prospects of agricultural machinery development and commercial manufacture in Nigeria.

AGE5303: Irrigation Systems Engineering (3 credits)
Water flow measurement. Design of open channels. Pumping power requirements. Design of irrigation systems; border/basin, sprinkler, drip/trickle and sub-surface. Salinity and quality of irrigation water. Reclamation of saline soils. Seepage from canals and canal lining. Design of an irrigation project. Irrigation water management.

AGE5304: Processing and Storage of Agricultural Products (3 credits)
Products processing techniques and equipment. Theory and methods of crop drying. Heat treatment. Psychrometry. Storage types and environment. Solid friction in relation to storage properties and structures; pressure distribution in storage structures. Factors causing deterioration of produce in storage. Environmental control in storage of: grains, fresh fruits and vegetables, livestock products (meat, milk, fish etc.). Containerization. Design of grain storage structures.

AGE5305: Farm Electrification (3 credits)
Electric codes, tariffs and regulations. Importance of electrification on the farm, Review of circuit theories, Electricity generation and transmission; farmstead distribution systems, testing procedure. Power supply systems, Power surge factor and correction; power distribution centres, lines, location, Selection and use of electric motors. Transformers. Energy conversion. Wiring: selection of power wire sizes, types of wire and wiring systems, over current protection, fuse box, control panel, circuit breaker, insulation and earthling. Farm lighting; fittings, design and calculation; luminance. Electric heating. Electric motors; connection, grounding, cooling methods. Electricity and electronics. Electrical sensors; types and uses. Application of electricity to handling, processing and storage of agricultural products. Basic electronics applications to farm electrical processes. Solar PV electricity.

AGE5306: Soil and Water Conservation Engineering (3 credits)
Types of erosion, Soil erosion by water and wind; Universal soil loss equation. Geographical distribution, principles, mechanics, assessment and control. Sediment transport, Land classification for conservation. Design, construction, operation and maintenance of erosion control structures. Desertification and control measures. Earth dams and farm ponds. Water resources conservation and development. Flood control measures. Socio-economic aspects of soil conservation.

AGE5307: Agricultural Power (3 credits)
Internal combustion engine systems: intake, exhaust systems, fuel systems; cooling systems; lubricating systems; transmission system: Clutch, gear box, propeller shaft, differential and final drives; Steering system; Brake system, Hydraulic system. Introduction to hitches and hitch systems. Safe tractor operation. Selection and management of tractors. Tractor testing and test codes. Tractor operator comfort: Ergonomics. Repair and maintenance of farm tractors. Hitches and hitch systems. Traction theory; wheel system. Design considerations of single-axle, two-wheel drive, four-wheel drive and crawler tractors. Tractor mechanics. Power measurement. Fluid controls. Field operations; preparation for operations, adjusting implements, selecting gears and engine speeds. Turning and stability of a tractor. Renewable Energy Power Sources: Bioenergy, solar thermal and pv wind, the otto and diesel engine cycle

AGE5308: Operation and Management of Farm Power and Machinery Systems (3 credits)
Operation and management of farm power and machinery systems. Integrated approach to machinery usage and agricultural production sequence. Farm tractors seasonality factor. Field capacities and field efficiencies. Machinery ownership and financing; cost of machine use, fixed and operating costs, rationale behind hiring or owning machine. Machinery management: timeliness concept and determination of timeliness coefficient, determination of optimum size of an implement, power requirement for operating farm equipment, machine reliability, performance of farm power and machinery under tropical condition, gross margin analysis. Optimizations of machinery input combinations. Management of farm enterprises. Case studies.

AGE5309: Agricultural Systems' Automation (3 credits)
Theory and applications of automation systems. Emphasizes features, capabilities, design and programming skills of Programmable Logic Controller (PLC) base industrial control systems. Introduction to industrial robots and sensors. Adaptation of industrial automation to agricultural areas, automation problems of agricultural production process, adjustment techniques, signal flow, transfer and reply functions, stability of systems, command systems, theoretical and analytical applications on agricultural automation methods, simulating technique and experimental data by electronic models. Mathematical model of control systems, Block diagram of control systems.

AGE5310: Automotive Service and Maintenance (3 credits)
Service and maintenance of all the components of an automobile.

AGE53011: Construction and Installation of Irrigation and Drainage Systems (3 credits)
Farm reservoirs and ponds. Pumping plant housing. Lined and unlined canals. Farm channels. Permanent and portable pipelines, outlets, hydrants and water measurements and diversion; regulation structures. Land preparation and grading, equipment and procedures. Drainage trenches and trenching machines; drainage pipe laying machines and procedures; molling and mole plows.

AGE5312: Agricultural Land Drainage (3 credits)
Elements of flow through porous media and surface drainage. Subsurface drainage. Design of drainage systems. Envelope materials and their design. Loads on conduits. Drainage pumping. Construction and installation of drains. Maintenance of drains.

AGE53213: Solid Waste Engineering and Air Pollution (3 credits)
Solid Waste: Basic concepts and theory and design of solid waste collection and disposal systems. Field and laboratory sampling and monitoring of solid wastes. Analysis of municipal, industrial and agricultural solid wastes. Solid waste handling and disposal methods. **Air Pollution:** Air-borne wastes and the control of atmospheric pollution: sources, type and effects of air pollutants. Analysis of particulate and gaseous. Pollutants by classical and instrumental methods. Meteorological phenomena affecting use of fuels and cleaning of gases. **Noise and Noise Control:** inter-relationship between the disposal of solid, liquid and gaseous wastes and the pollution of air, soil and water.

AGE5314: GIS Applications to Agriculture (3 credits)
Introduction to Geographic Information Systems (GIS), GIS data structures, Introduction to GIS packages (ArcGIS), Principles and applications of GIS technologies. Identification and delineation of locations and areas; collection, analysis, storage and retrieval of site and time specific data for agricultural and natural resource management and monitoring.

AGE5315: Renewable Energy Applications to Agriculture (3 credits)
Sustainability of Agricultural energy systems: introduction to renewable energy. Solar energy: solar radiation, solar heating and cooling systems, solar energy conversion systems. Wind energy: wind resources and meteorological variables, wind energy conversion system. Biomass energy: bio-resources, biogas generation and use in agriculture, bioethanol and biodiesel production and use as automobile and tractor fuel. Hydropower: energy resources and potentials, energy conversion systems, constraints and environmental concerns.

AGE5316: Food Engineering (3 credits)
Application of the steady flow Energy Equation*:* Boiler and condensers. Turbines. Adiabatic steady flow processes. Throttling. Isothermal steady flow processes. **Vapor Power Cycles:** The Carnot Cycle. The Rankine Cycle. Comparison of Cycles. The Reheat Cycle. The Regenerative cycle. The economizer and the air preheater. **Gas Power Cycle:** Internal combustion engines and air standard cycles. The simple gas turbine cycle. The jet engine. Reciprocating engine cycles. Otto and Diesel cycles. **Properties of Mixtures:** Mixtures of gases. The mixing process. Gas and vapour mixtures. Hygrometry. Cooling towers. Introduction to food processing engineering, Heat and mass transfer, and Insulation. Heat exchangers-design and applications. Heat and cold preservation of foods, Food packaging, Food quality control, Principles and design of food equipment.

AGE5317: Engineering Properties and Handling of Agricultural Products (3 credits)
Physical, mechanical, rheological and thermal properties of agricultural products. Newtonian and non-newtonian fluids. Handling methods. Design and construction of appropriate material handling equipment for tropical products. Economics of material handling.

AGE5318: Farm Transportation (3 credits)
Farm roads. Farm transportation systems. Development and construction of farm transport equipment. Farm transport system-standards and specification, Ergonomics.

AGE5319: Agricultural Machinery (3 credits)
Tillage: primary, secondary tillage and minimum tillage. Tillage equipment: ploughs, tillers, sub-soilers, Harrows and cultivators. **Planting equipment**: Planters, drills and broadcasters and hill droppers, Fertilizer distributors; Spinning disc, side dresser and manure spreader. Plant protection equipment: Manually operated sprayer, power operated boom sprayer, mist blower and dusters, CDA sprayers, and granule applicators. Introduction to harvesting equipment: hay and forage harvesting, mowers, conditioners, balers, Combine harvesters, Cotton picking and stripping, and Root crops harvesting equipment. Field machinery evaluation, Criteria for machinery replacement and Cost analysis in the use of Agricultural machines. Research and development in farm machinery; human factors in design. Design features of equipment for tillage, seeding and planting, fertilizing, spraying and harvesting. Testing of farm machinery.

AGE5320: Theory and Design of Tractor Engine (3 credits)
Introduction to intake, compression, combustion, expansion and exhaust processes in an engine; thermal balance of an engine, kinetics and dynamics of engines; kinematics of crankshaft – connecting rod mechanism, forces acting on crankshaft – connecting rod mechanism, design of engine parts: piston, piston rings, piston pin, connection rod, crankshaft, valve and valve mechanism; design of engine systems; fuel, lubricating and cooling; combustion chamber design.

AGE5321: Ground Water Technology (3 credits)
Types and principles of ground water production; design; construction, installation; operation, maintenance. Harnessing of ground water. Production equipment: rigs, pumps, casing, screens and meters. Conservation and management of ground water resources. Aquifer management: abatements, regulations pollution controls and groundwater recharge.

AGE5322: Operation and Maintenance of Irrigation and Drainage Systems (3 credits)
Organization of operation personnel. Irrigation water supply schedules: Field procedures, moisture monitoring and field efficiency measurements. Operation and maintenance of pumps and pumping plants, canals, farm channels, open ditches, surface and sub-surface field drains. Repair of concrete linings, breaches and bank collapse. Case studies in operation and maintenance.

AGE5323: Storage of Fresh Fruits and Vegetables (3 credits)
Cool and cold storage. Environmental control in storage. Containerization design. Evaporative cooling. Refrigeration plant: development, design, operation and maintenance. Basic principles of cold storage of perishable produce. Influence of temperature on chemical reactions and growth of micro-organisms. Compatibility of stored produce. Thawing and its effects on quality. Cold rooms and cold stores. Energy economics of refrigerated storage.

AGE5324: Solar Energy Applications for Processing and Storage (3 credits)
Fundamentals of solar radiation. Solar heating and cooling heat transfer. Solar energy conversion efficiency, principles of solar collectors. Solar heat storage and storage systems for tropical crops.

AGE5601: Project and Seminar (6 credits)
Individual student project to deepen knowledge, strengthen practical experience and encourage creativity and independent work. Students are required to study special problems in Agricultural and Environmental Engineering and submit reports in prescribed forms; project and seminar spread over the last two semesters. The project ends with a comprehensive written report.

SECTION THREE

3.0 GENERAL ACADEMIC CONDUCT, MISCONDUCT AND DISCIPLINE

The Department of Agricultural and Environmental Engineering and the university as a whole expect students to conduct themselves in an exemplary manner during their interactions with members of the university community and to live peacefully with them.

3.1 REGISTRATION PROCEDURES AND REGULATIONS

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.
2. 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.
3. Returning students must complete the registration process within two weeks from the date registration starts.
4. A returning student who fails to complete the registration process within the two-week 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.
5. 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.
6. 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.
7. 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 publicized to the students, and that all staff members involved in the exercise maintain effective office hours so that students could see them without hindrance.
8. 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.

9. 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 work out the exact number of credits to be registered in conjunction with his/her Level Coordinator.
10. 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 Level 100 requirement for a 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).
11. 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.
12. 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.
13. A student shall not repeat any course that he/she has passed, irrespective of the passing grade.
14. 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.
15. 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 is not registered, the result of such an examination shall be cancelled.
16. 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.

17. 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.

3.2 EXAMINATION PROCEDURES AND REGULATIONS

Credible examination is the only measure used in determining the success or failure of any University system. That is why students found to be engaged in examination irregularities are out rightly disciplined. 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:

1. Students are expected to read all notice boards, bulletins and other related media in the University to keep them abreast with what is the happening. REFUSAL TO READ NOTICES from the designated media is not an excuse for not performing any academic activity.
2. Attendance at lectures, practicals 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.
3. 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.
4. 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.

3.2.1 Examination Procedures

1. It shall be the responsibility of each student to make sure that he/she is registered for the appropriate examinations and be sure of the dates, times and places of the examinations for

which he is registered; also to ensure that he is in possession of any identity document prescribed for the examinations.

2. The appropriate University unit shall ensure that identity documents are available to students at least two weeks before each examination.
3. 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.
4. A student shall bring his identity document to each examination and display it in a prominent position on his desk.
5. 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.
6. 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.
7. Each student shall also sign out after submitting his/her answer script by signing the appropriate column of the attendance register.
8. A student shall write his examination number, but not his name, distinctly on the cover and on every page of the answer book, as well as on any extra sheets used.
9. The use of scrap paper, question paper, toilet tissue, etc, for rough work is not permitted. All rough work must be done in answer books and crossed neatly through, or in supplementary answer books which must be submitted to the Invigilator.
10. 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.

11. A student may be permitted by the Invigilator to leave the examination room during the course of an examination provided that:-
    a. No student shall normally be allowed to leave during the first thirty (30) minutes or the last ten (10) minutes of the examination.
    b. A student leaving must sign out and hand his script to the Invigilator before leaving if he does not intend to return.
    c. A student who leaves the examination room shall not be re-admitted unless throughout the period of his absence he has been continually under the supervision of an invigilator or Examination Attendant.
12. No student shall speak to any other student or, except as essential, to the Invigilator or make any noise or disturbance during the examination. Smoking is not permitted in the Examination hall during any examination.
13. A student must not directly or indirectly give assistance to any other student or permit any other student to copy from or otherwise use his papers. Similarly a student must not directly or indirectly accept assistance from any other student or use any other student's papers.
14. At the end of the time allotted, each student shall stop writing when instructed to do so and shall gather his scripts together. He shall then remain at his desk until all candidates 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.
15. Except for the printed question paper, a student may not remove from the examination room or mutilate any paper or other materials supplied.

3.2.2 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.

3.2.2.1 Misconduct in Examination Hall Vicinity and Other Institutions

1. 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.
2. 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.
3. Examination misconduct cases discovered during the marking of the examination scripts are also subject to appropriate investigations and further necessary action.

3.2.2.1.1 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 publicised 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:
    a. 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;
    b. 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.
11. If the question paper for an examination that has already taken place is suspected as having been leaked, the Chief Examiner shall immediately:
    a. 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.
    b. Report to the Vice-Chancellor who is the Chairman of Senate.
12. 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.

3.3 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

i. Impersonating another student, or being impersonated by another student at an examination.
ii. Exchanging names and/or numbers on answer scripts/sheets.
iii. Introduction and use of relevant unauthorised material(s) into the examination hall.

iv. Exchange of materials (such as question papers, examination cards) containing jottings which are relevant to the ongoing examination in the examination hall.

v. Theft and/or illegal removal of examination scripts.

vi. Any kind of mischief likely to hinder the smooth conduct of the examination. For example causing fire, flooding, or engaging in physical violence.

vii. Collaborating with, or copying from, another candidate.

viii. Cheating outside the examination hall, such as in toilets, hall of residence, etc.

ix. Use of mobile phones or any other unauthorized electronic device.

x. An offence which falls under category B committed by a student who was previously rusticated.

xi. Any offence under this category committed by a student of this University in another institution.

xii. Destruction of exhibit by candidates.

xiii. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant expulsion.

1. Category of Offences Punishable by Rustication

i. Facilitating/Abetting/Aiding cheating by another candidate.

ii. Introduction, but not use, of relevant unauthorised materials to the examination hall.

iii. Acts of misconduct (such as speaking/conversation) during the examination which is likely to disrupt the conduct of the examination.

iv. Bringing mobile phones or any other unauthorized electronic device into the examination hall.

v. An offence in category C committed by a previously warned or rusticated student.

vi. Any offence under this category committed by a student of this University in another institution.

vii. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant rustication.

C. Category of Offences Punishable by Written Warning

i. Introduction of unauthorised irrelevant materials into the examination hall.

ii. Writing on the question paper.

iii. Any offence under this category committed by a student of this University in another institution.

iv. Any other misconduct deemed by the Senate Committee on Examination Misconduct and Senate to warrant warning.

3.3.1 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

i. Submitting a final year project that was done by someone else.

ii. Submitting, as final year project, a work submitted earlier for another purpose (by him/ herself or by others, at the University or somewhere else).

iii. Repackaging a whole project as his/her own product.

iv. Any other offence related to final year project deemed by the Committee to merit expulsion.

B. Offences Punishable by Rustication

i. Substantial plagiarism of the work (s) of others in final year projects.

ii. Fabrication or intentional misrepresentation of data, experimental results, analysis, etc used in final year projects.

iii. Intentional sabotage of the final year project (or part thereof) of other students.

iv. Any other offence related to final year project deemed by the Committee to merit rustication.

C. Offences Punishable by Written Warning

i. Failure to credit sources in final year projects.

ii. Faking of citations in final year projects.

iii. Submitting a report written by someone else for SIWES, Internship, and other courses where such reports form substantial part of the assessment.

iv. Submitting, as SIWES/Internship a work submitted earlier for another purpose (by him/herself or by others, at the University or somewhere else).

v. Repackaging a whole report as his/her own product.

vi. Substantial plagiarism of the work of others in SIWES/Internship and other reports.

vii. Fabrication or intentional misrepresentation of data, experimental results, analysis, etc used in SIWES/Internship and other similar reports.

viii. Any other offence related to final year project or reports deemed by the Committee to merit a written warning.

D. Offences Punishable by Failure in the Course

i. 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.

3.4 Notification of Examinations Results

1. (a) No results of examinations may normally 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.

2. (a) Unless otherwise approved in advance by Senate, written statements of first semester results shall not be issued to a student or other unauthorized person.

   (b) 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.

3. 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.

4. 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.

5. 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.

6. 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.

3.5 Right of Appeal

1. 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.
2. 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.
3. 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.

3.6 Add/Drop of Courses

"Dropping a Course", means removing it from a student's record whether or not it is replaced by another course. *"Adding"* means taking on a course in addition to (or as a replacement for) the course earlier registered. This exercise may be carried out within the period of normal registration or during a given period of grace (normally two weeks). A course successfully dropped is not reflected in a student's record at all. Registered students may make minor changes in the courses registered for (by adding and/or dropping some courses) at the beginning of the second semester.

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.

3.7 Verification

This is initiated at the student department. Any student with a missing result should lodge a complaint to his level coordinator, who in turn fills in a verification form which is supposed to be taken to department where the missing is by the coordinator himself. In no account should verification form be handled by the student.

SECTION FOUR

4.0 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 colored eye glasses, not on medical grounds in the classroom.

4.1 PENALTIES FOR VIOLATION OF THE DRESS CODE

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**.**

SECTION FIVE

5.0 IMPORTANT OFFICERS/RESPONSIBILITIES AND THEIR FUNCTIONS

5.1 Head of Department

Functions:

1. The Head of Department will, with diligence and had-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.

5.2 Departmental Examination Officer

Functions*:*

1. The Departmental Examinations Officer is responsible to attain 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.

5.3 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.

5.4 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.

5.5 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.

5.6 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.

5.7 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.

5.8 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.

5.9 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.

5.10 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.

5.11 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.

5.12 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 far 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.

5.13 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.

5.14 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.

SOME EQUIPMENT IN THE DEPARTMENT