

# BACHELOR OF SCIENCE (HONOURS) DEGREE IN ENVIRONMENTAL SUSTAINABILITY

## STUDENTS' INFORMATION HANDBOOK



**JOSEPH SARWUAN TARKA  
UNIVERSITY, MAKURDI**  
(Formerly FEDERAL UNIVERSITY OF  
AGRICULTURE MAKURDI)

**DEPARTMENT OF ENVIRONMENTAL  
SUSTAINABILITY**







**Engr. Professor Isaac N. Itodo**

FNSE, FAEng, NPOM

**Vice-Chancellor**

Joseph Sarwuan Tarka University,  
Makurdi





**DR. S.T. SWEM**

Ag. Dean, College of Physical Sciences



**PROFESSOR RAYMOND A. WUANA**

FICCON, FCSN, FCAI

Head of Department



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## WELCOME NOTE

Welcome to the Department of Environmental Sustainability, Joseph Sarwuan Tarka University, Makurdi (JOSTUM) (formerly Federal University of Agriculture, Makurdi). The Environmental Sustainability programme is supported by the World Bank under the Sustainable Procurement, Environmental and Social Safeguards Enhancement (SPESSE) Project of the Federal Government of Nigeria. The SPESSE Project is a novel approach to building human capacity for sustainable development.

The programme is one of three programmes offered in this SPESSE project. To this end, we strive to develop innovative solutions targeted at addressing challenges that pertain to the environment. Currently, we offer undergraduate, postgraduate diploma and Master of Science (M.Sc.) degree programmes. Our major drive is to provide high-quality teaching, research and community service in order to play a significant role in capacity development in the area of environmental sustainability in line with the overall mission and mandate of the university. We believe that this is one of the keys to sustainable economic transformation.

In pursuit of our vision, therefore, we are involved in the following streams of activities:

1. Preparation of undergraduate and postgraduate students for fulfilling careers in academia, industry, governmental and non-governmental organizations.
2. Enhancing development through research, new knowledge and techniques that are relevant to the sustainable environmental protection in development.
3. Communication of research findings through scholarly publications and educational programmes of value to stakeholders.
4. Continually exploring contemporary (extant and emerging) environmental issues and solutions, such as climate change, carbon footprint tracking, waste management, environmental auditing and environmental conservation through international best practices.





The Department of Environmental Sustainability is in partnership with the Centre for Innovation in Procurement, Environmental and Social Standards (CIPESS). Our students are expected to benefit from industry-based projects, expert guest-lectures from national and international scholars. They will also be exposed to industrial hands-on experiences.

This Student Information Repository contains general information that may be helpful to any registered or prospective student of the University. However, the larger content is intended to provide valid and useful information to our students. The ultimate goal is to ameliorate recurrent administrative and academic difficulties faced by our students in accessing information about the university in general, and specific departments. Therefore, I will like to employ you to patiently read through this material because every page has been carefully prepared to equip you for what lies ahead in the course of your study here.

As an academic unit, we are committed to achieving excellence in research, teaching and student mentorship by our faculty. The office of the Head of Department is always open to all students. Feel free to contact the office in the event of any ambiguity. I do sincerely hope that you take advantage of our high quality academic and non-academic staff as well as our equipped laboratories in the course of sojourn here in JOSTUM, WELCOME!

PROFESSOR RAYMOND A. WUANA FICCON. FCSN, FCAI  
Head, Department of Environmental Sustainability







# **BACHELOR OF SCIENCE (HONOURS) DEGREE IN ENVIRONMENTAL SUSTAINABILITY**

**CENTER FOR INNOVATION IN  
PROCUREMENT, ENVIRONMENTAL  
AND SOCIAL STANDARDS (CIPESS)**



# 1 ■ INTRODUCTION

The activities of human beings to a large extent pollute the environment. The need to regulate the amount of pollutants in the environment means that a standard or control should be put in place. Environmental regulation and standards refer to a set of specific rules that authorize and control a given firm's activities so that it operates within legally and socially acceptable parameters.

The programme, Bachelor of Science in Environmental Sustainability, is designed as a four year degree programme. It is interdisciplinary in nature, drawing upon the diversity of environmentally related departments and disciplines. Students are to explore a wide variety of environmental issues, including:

- The social and human environment such as urban and regional planning, ethical and value systems, environmental law and policy, indigenous and religious beliefs, history and impact of past decisions, and environmental impact analysis.
- The physical environment including the hydrologic cycle, waste management, coastal processes, energy production technologies, soil preservation, geography, and air/water pollution.
- The biological environment including the function of ecosystems, population dynamics, and toxicology.

## 2 ■ FACULTY/DEPARTMENT OF DOMICILE

The B.Sc. programme is domiciled in the Department of Environmental Sustainability under the College of Physical Sciences, Joseph Sarwuan Tarka University, Makurdi..

## 3 ■ PHILOSOPHY, AIMS AND OBJECTIVES OF THE PROGRAMME

### 3.1. Philosophy

The programme is designed to provide students with the scholarly background and intellectual skills necessary to understand complex environmental problems in order to formulate good policies and take informed decisions on issues relating to the environment.



### 3.2. Aim and Objectives

The aim of the Environmental Sustainability programme is to produce competent, intellectually mature, ethical and socially responsible environmental resource managers. The specific objectives of the programme are to:

- i. Create knowledge on ethical and value systems, environmental law and policy, indigenous and religious beliefs, history and impact of past decisions, and environmental impact analysis.
- ii. Create in the student an awareness and comprehension of a wide range of environmental challenges and opportunities in the immediate and wider region.
- iii. Provide comprehensive knowledge of management systems, legal framework and social/cultural issues pertaining to utilization of natural resources.
- iv. Develop skills and knowledge for translating the theory and concepts of resource and Environmental Standards into practice relevant to communities and workplaces today.
- v. Create knowledge about geophysical and biological processes and constraints characterising human activities and their interaction with the environment.
- vi. Develop skills in the application of monitoring and Environmental Standards tools used by resource and environmental practitioners.

## 4 ■ LEARNING OUTCOMES

### 4.1. Regime of Subject Knowledge

The degree will provide students the knowledge and understanding required by today's Environmental Scientists, with career opportunities in Environmental Management, Environmental Toxicology, Research, Consultancy, Policy and Environmental Protection, and in setting guidelines, values and environmental standards.

### 4.2. Competencies and Skills

The degree programme emphasises the importance of integrating Biology, Ecology, Chemistry, Physics, Geography and Geology in order to understand the Science of human impact on the environment, and how this knowledge needs to be applied within the context of social, legal and political frameworks to resolve some of the major environmental issues facing the world. The programme focuses on three targets viz.: the need to avoid adverse health impacts from high pollution levels, protect the environment, and to contribute to sustainable development.



#### 4.3. Behavioural Attributes

Graduates of Environmental Standards are governed by their code of professional conduct of the professional body. These attributes relate to the ability to:

- i. Discharge professional obligations to members of the public;
- ii. Display professional integrity; and
- iii. Exhibit competence with ethics.
- iv. Comply with the environmental regulations of society; and
- v. Participate in professional environmental management.

## 5 ■ ADMISSION AND GRADUATION REQUIREMENTS

### 5.1. UTME Admission:

The minimum academic requirement is credit level at not more than two sittings in five subjects at O' Level in nationally recognised examinations including English Language, Mathematics and any other three subjects from the following list; Biology, Chemistry, Physics, Geography, Economics, Government and Agriculture.

### 5.2. Direct Entry Admission:

A-Level credit passes in at least two relevant subjects in addition to 5 O'level credits as in 5.1. above; National Diploma (ND) in a relevant discipline with at least upper credit grade in addition to 5 O'level credit as in 5.1 above; HND in relevant disciplines with at least lower credit in addition to 5 credits as in 5.1 above. Direct Entry students may be admitted into the programme at 200 level.

## 6 ■ PROGRAMME DURATION

The programme is expected to last for a minimum of eight (8) or maximum of ten (10) academic semesters for UTME entry mode students and six (6) or eight (8) academic semesters for Direct Entry admission candidates respectively. A minimum of six months of Student Industrial Work Experience Scheme (SIWES) is required.

## 7 ■ GRADUATION REQUIREMENTS

The minimum total credit units required for graduation is 150 and 120 for UTME and Direct Entry students respectively. In order to graduate, a student must pass all compulsory and required courses as indicated in the CCMAS.



# 8 ■ COURSE CREDIT SYSTEM

## 8.1. COURSE SYSTEM

Academic work in the Environmental Sustainability is organized in concentrated modules of subject materials referred to as courses. Each course is planned as a complete unit of study with a scheduled amount of instructional/contact hours in a semester.

Credits are weights attached to a course. One credit is equivalent to one hour per week per semester of 15 weeks of lectures or three hours of laboratory/studio/workshop work per week per semester of 15 weeks

The course credit system is a quantitative system of organization of the curriculum in which subject areas are broken down into unit courses which are examinable and for which students earn credit(s) if passed. The courses are arranged in progressive order of complexity or in levels of academic progress, e.g. 100 Level or year 1 courses are 100, 101 etc. and 200 Level or year II courses are 200, 202 etc. The second aspect of the system is that courses are assigned weights allied to Units.

## 8.2. CREDIT UNITS

Credit units consist of a specified number of student-teacher contact hours per week per semester. Units are used in two complementary ways: one, as a measure of course weighting, and the other, as an indicator of student work load.

i. As a measure of course weighting for each Unit course (e.g. CHM 101, PHY 102), the credit unit to be earned for satisfactorily completing the course is specified; e.g. a 2-credit unit course may mean two 1-hour lectures per week per semester or one 1-hour lecture plus 3-hour practicals per week per semester.

ii. As a measure of work load, "One Credit Unit" means one hour of lecture or one hour of tutorial per week per semester. For other forms of teaching requiring student teacher contact, the following equivalents may apply: two hours of seminar; three hours of laboratory or field work, clinical practice/practicum, studio practice or stadium sporting activity, six hours of teaching practice; four weeks of industrial attachment where applicable. The minimum credit load per semester is 15 credit units.

Normally, in Course Credit System, courses are mounted all year round, thus enabling students to participate in examinations in which they are unsuccessful or unable to participate on account of ill health or for other genuine reasons. In such a system, no special provisions are made for resit examinations.



The minimum number of credit units for the award of a degree is 120 units, subject to the usual Department and Faculty requirements. A student shall therefore qualify for the award of a degree when he has met the conditions.

For the purpose of calculating a student's cumulative GPA (CGPA) in order to determine the class of Degree to be awarded, grades obtained in all the courses whether compulsory or optional and whether passed or failed must be included in the computation.

Even when a student repeats the same course once or more before passing it or substitutes another course for a failed optional course, grades scored at each and all attempts shall be included in the computation of the CGPA. Prerequisite courses must be taken and passed before a particular course at a higher level.

### **8.3. COURSE CATEGORIES**

#### **i. Core/Compulsory Course:**

A core course is that which every student must compulsorily take and pass in any particular programme at a particular level of study.

#### **ii. Elective Course**

An elective course is that which students take within or outside their faculty. Students may graduate without passing the course provided the minimum credit requirement for graduation had been attained.

#### **iii. Optional Course**

A course which students can take based on interest and may count towards the minimum credit unit requirement for graduation.

#### **iv. Pre-requisite Course**

A prerequisite course is that which a student must take and pass before taking a particular related course at a higher level.

#### **v. Required Course**

A required course is that which a student must take at a level of study and must be passed before graduation.





## 8.4. GRADING OF COURSES

### 8.4.1. Grade Points

At the end of each course, a grade comprising a percentage score and a corresponding letter grade is awarded to each student. These grades will include the results of both formative and summative assessments conducted throughout the Programme duration. Range of percentage scores, letter grades and numerical grade point equivalents are indicated in the Table

**Table 17: Grade Points**

Score (%)	Letter Grade	Grade Points
70 – 100	A	5.00
60 – 69	B	4.00
50 – 59	C	3.00
40 – 45	D	2.00
40 – 44	E	1.00
Below 0-39	F	0.00

### 8.4.2. Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

A system of Grade Point Average (GPA) and Cumulative Grade point Average (CGPA) is currently in use in the Nigerian University system. Grade Point Average and Cumulative Grade Point Average are calculated as numerical representations of a student's quality of performance. These averages are used to determine if a student qualifies for certain academic actions (e.g., probation, graduation and class of degree)

A student's Grade Point Average (GPA) is the weighted mean value of all grade points earned through examinations and other forms of formal assessment in a particular academic semester/session. While the Cumulative Grade Point Average (CGPA) is the weighted mean value of all the Grade Point Averages earned since enrolment on the particular programme.

For the purpose of determining a student's standing at the end of every semester, the Grade Point Average (GPA) system shall be used. The GPA is computed by dividing the total number of Units x Grade Point (TUGP) by the total number of units (TNU) for all the courses taken in the semester as illustrated in Table 18.

The Cumulative Grade Point Average (CGPA) over a period of semesters is calculated in the same manner as the GPA by using the grade points of all the courses taken during the period as shown in Table 18.





**Table 18: Calculation of GPA and CGPA**

Course	Units	Grade Point	Units x Grade Point (UGP)
C <sub>1</sub>	U <sub>1</sub>	GP <sub>1</sub>	U <sub>1</sub> x GP <sub>1</sub>
C <sub>2</sub>	U <sub>2</sub>	GP <sub>2</sub>	U <sub>2</sub> x GP <sub>2</sub>
-	-	-	-
-	-	-	-
C <sub>i</sub>	U <sub>i</sub>	GP <sub>i</sub>	U <sub>i</sub> x GP <sub>i</sub>
-	-	-	-
-	-	-	-
C <sub>N</sub>	U <sub>N</sub>	GP <sub>N</sub>	U <sub>N</sub> x GP <sub>N</sub>
<b>TOTAL</b>	<b>TNU</b>		<b>TUGP</b>

$$TNU = \sum_{i=1}^N U_i$$

$$TUGP = \sum_{i=1}^N U_i * GP_i$$

$$CGPA = \frac{TUGP}{TNU}$$





## 8.5. DEGREE CLASSIFICATION

Students are ordinarily expected to register for a minimum of 18 units each semester including all compulsory and required courses. Courses in all the programmes are normally taught for a semester of fifteen (15) weeks duration. In addition to these general provisions, students are expected to satisfy the specific requirements of individual programmes with regards to compulsory and required courses in order to qualify for graduation.

The overall performance of each student shall be based on a 5-point scale Cumulative Grade Point Average (CGPA) system. Degree qualifications are classified as shown in Table 19.

Table 19: Classification of Bachelor's Degree

<b>Cumulative Grade Point Average (CGPA)</b>	<b>Class of Degree</b>
4.50 – 5.00	1 <sup>st</sup> Class Honours
3.50 – 4.49	2 <sup>nd</sup> Class Honours (Upper Division)
2.40 – 3.49	2 <sup>nd</sup> Class Honours (Lower Division)
1.50 – 2.39	3 <sup>rd</sup> Class Honours
1.00 -1.49	Pass degree

A maximum period of 8 or 10 semesters respectively is allowed for an honours degree.

A student will normally be allowed to remain on a programme for a period not exceeding 1½ times the stipulated Programme Duration.





## **8.6. PROBATION AND WITHDRAWAL**

### **8.6.1. Probation**

A student shall be placed on academic probation if at the end of the second semester of an academic year the student earns less than 1.0 Cumulative Grade Point Average (CGPA), to conform to JOSTUM Senate regulations. During Probation, a student will be expected to register for all failed courses as well as other compulsory and required courses which the student may have failed to register for in an attempt to improve the CGPA.

A student on probation may be allowed to register for courses at the next higher level in addition to his/her probation level courses provided that:

- i. the regulation in respect of student work-load is complied with; and
- ii. Pre-requisite courses for the higher-level courses have been passed.

### **8.6.2. Withdrawal**

A student shall be asked to withdraw from a particular programme if at the end of a probation period the student fails to make satisfactory progress (CGPA at least above 1.0). Such a student may however be allowed a change of programme within the same university or alternatively asked to withdraw from the university.

## **8.7. EVALUATION**

### **8.7.1. Techniques for Student Evaluation**

The primary goal of assessment is to improve the overall quality of learning as well as evaluate the quality of instruction. It is recommended that different types of formative and summative evaluation methods be adopted through the semester for all courses offered in the environmental science discipline. The list below though not exhaustive, highlights some of the more common methods of assessment that may be adopted for students' course performance evaluation:

- i. Problem Solving Exercises
- ii. Term Papers/Essay Assignments
- iii. Individual Project Work
- iv. Oral Presentations
- v. Design studio exercises
- vi. Surveys and Evaluation reports
- vii. Laboratory Reports
- viii. Collaborative Project Work
- ix. Report on External Placement (SIWES)
- x. End of semester examinations
- xi. External Examination Reports



### **8.7.2. Assessment of theory subjects**

Assessment used for theory subjects should include continuous monitoring of student's progress by subject lecturers through course work evaluation. Continuous assessment may involve class tests, tutorial assignments, seminar presentations, and reports on fieldwork, class attendance and so on. These should carry 30% for any course. The final end of semester examination will normally account for the balance of 70% of the overall marks for the course.

### **8.7.3. Assessment of Seminar projects**

The regular formative review of seminar projects is encouraged as an important part of the learning process. Students are required to present their seminar to an audience that may comprise fellow students, technical staff and faculty at least at the end of each project. Feedback and scores may be given in these instances. The summative assessment of the design studio work is usually carried out by well-informed assessors based on predetermined assessment criteria. Scores in these assessments are usually very subjective and rely on the judgements of the expert assessors.

## **8.8. EXTERNAL EXAMINATION SYSTEM**

The involvement of external examiners from other universities is a crucial quality assurance requirement for all courses in Nigerian University System. In this regard, external examiner should go beyond mere moderation of examination questions to examining of examination papers to scope and depth of examination questions vis-a-vis the curricular expectation.

## **8.9. SIWES RATING AND ASSESSMENT**

Environmental Sustainability students shall be exposed to a combination of field and office experience both in the public or private sectors relevant to their various disciplines. This is achieved through the students' participation in the supervised Student Industrial Work Experience Scheme (SIWES). SIWES shall be undertaken in an approved establishment. A minimum period of 24 weeks of SIWES should be undertaken as part of the graduation requirements.

At the end of the SIWES programme, each participating student is required to submit a systematic log-book for assessment by the programme in addition to undergoing any other forms of assessment as may be required by individual programmes and institutions. Individual programmes will be expected to allocate credit unit ratings to the SIWES training programme that count towards the requirements for graduation. Students with unsatisfactory performance in SIWES shall be required to repeat the training programme.

## **8.10. STUDENT EVALUATION OF COURSES**

As an integral part of the course credit system, students will be given the opportunity to evaluate the courses taken in the semester based on the following criteria:





- i. Course relevance
- ii. Adequacy in terms of time and content coverage
- iii. Students understanding of the courses
- iv. Adequacy of Teaching, tutorials and practicals technology/aids
- v. Instructor evaluation

The students' course evaluation is aimed at improving the efficiency of course delivery by offering timely feedback to the course lecturers/instructors. It is expected that each programme will work out a mechanism to achieve this goal.

### **8.11. MAINTENANCE OF CURRICULA RELEVANCE**

The various curricula for Environmental Sciences should be reviewed regularly as reflected in each individual programme. It is recommended that general reviews be conducted at least once every five (5) years, in full consultation with the relevant professional bodies.

One of the well-established modes for maintaining programme and curricula relevance is through accreditation exercises. The detailed procedures for programme validation and accreditation may be found in relevant sections of programme accreditation guidelines for the various professional bodies.

The general performance indicators useful for programme accreditation and for internal programme reviews are as specified in individual programmes in terms of the following:

- i. Programme content and delivery
- ii. Staff composition and quality
- iii. Student admissions, retention and graduation
- iv. Available Facilities: spaces and equipment
- v. Employers ratings of graduates
- vi. Overall programme administration

### **8.12. PERFORMANCE EVALUATION CRITERIA**

Accreditation is a system of recognising educational institutions (universities and programmes offered by them) for a level of performance, integrity and quality which entitles them to the confidence of the educational and professional community, the public they serve, and employers of labour. The objectives of the accreditation exercise are to:

- i. Ensure that at least the provisions of the minimum academic benchmark statements are attained, maintained and enhanced.
- ii. Assure employers and other members of the community that graduates of these institutions have attained an acceptable level of competence in their areas of specialisation.

Certify to the international community that the programmes offered in these universities are of high standards and that their graduates are adequate for employment and for further studies.



# 9

## ■ RESOURCE REQUIREMENTS FOR TEACHING AND LEARNING

### 9.1. PERSONNEL

The personnel requirements for the programme should reflect student population and the variety of activities to be performed in the classrooms, studios, laboratories and workshops. The ratios should conform to the NUC minimum guidelines on teacher/student ratio of 1:20 for the Environmental Sciences Discipline.

#### 9.1.1. Academic Staff

The point of entry for each of the recognised academic positions should reflect appropriate academic qualifications, and experience in both teaching and professional practice. Details of the requirements for the various positions are indicated in Table 20.

**Table 20: Qualifications for Engagement of Academic Staff**

	LEVEL	QUALIFICATIONS
i.	Graduate Assistant	A good Bachelor's Degree in Environmental Sustainability or a closely related area (with a minimum Second-Class Upper Division) This is a training position, and staff in this category are expected to complete their Master's degree within two years of their appointment.
ii.	Assistant Lecturer	A Master's Degree in addition to a good Bachelor's Degree.
iii.	Lecturer II	<ul style="list-style-type: none"> <li>A PhD Degree for engagement;</li> <li>By promotion from Assistant Lecturer rank after a minimum of three years in addition to fulfilling other promotion requirements</li> </ul>
iv.	Lecturer I	In addition to the qualifications specified for Lecturer II, Lecturer I should have had at least three years post-doctoral teaching experience and demonstrated ability for research work and evidence of scholarship.
v.	Senior Lecturer	A PhD Degree in addition to meeting the requirements for publications, teaching and other conditions stipulated in the guideline.
vi.	Associate Professor	Basic qualifications set out for Senior Lecturer plus at least three years of experience. Must have considerable publications resulting from research as well as demonstrated academic leadership ability. An Associate Professor should have evidence of participation in University administration and community activities. External assessment is required for promotion to the level of an Associate Professor.
vii.	Professor	Basic qualifications as for Associate Professor. Must have had at least three years of experience as Associate Professor in addition to meeting the necessary publications. A Professor should demonstrate clear evidence of scholarship as well as academic and administrative/professional leadership.



### **9.1.2. Academic Support Personnel**

Teaching Assistant/Demonstrators are recommended to assist lecturers in the conduct of tutorials, practical and fieldwork.

### **9.1.3. Administrative Support Personnel**

The services of the administrative support staff are indispensable in the proper administration of the departments and faculty offices. These will normally include confidential secretaries, clerical officers, typists, messengers and cleaners.

### **9.1.4. Technical Support Personnel**

The technical support personnel shall consist of technical officers and technologists. It is important to recruit very competent senior technical staff to maintain teaching and research equipment.

## **9.2. PHYSICAL FACILITIES**

### **9.2.1. Spaces**

For the good administration of the B.Sc. (Honours) programme, adequate facilities should be provided for the offices of the Center. The required minimum standards for each of the programmes are reflected in the relevant sections for each programme. Spaces will normally include:

- i. Office Accommodation
- ii. Classroom Space
- iii. Studio Space
- iv. Seminar Rooms
- v. Drawing Offices
- vi. Workshop Spaces
- vii. Library

In the case of the Office of the CL/DCL, office accommodation should be provided as follows:

- i. CL/DCL's Space
- ii. Secretary to the CL/DCL
- iii. General Office
- iv. Conference Room



**Table 21: Minimum Space Requirement**

	Space	Use	Minimum (m <sup>2</sup> )
1	Dean's / HOD's Office	Administration	24
2	Professors Office	Academic	18.5
3	Senior Lecturer	Academic	10
4	Other ranks of Academic staff	Academic	8
5	Senior Technical Staff	Technical	12
6	Senior Administrative Staff	Administration	12
7	Junior Technical Staff	Technical	6
8	Junior Administrative Staff	Administration	4
9	Studio Space	Students	3
10	Lecturer Space	Students	0.5
11	Seminar Space	Students	0.5
12	Laboratory Space	Students	2
13	Library	Students	2
14	Social Space	Students	0.5
15	Storage Space	Students	0.5

**9.2.2. Equipment**

The programme should be provided with requisite laboratories, studios and workshops with relevant equipment in relation to student population and variety of activities performed in each programme. To achieve the benchmark standards for the programme, there should be:

- i. A minimum number of well-equipped laboratories for the programme that meet the minimum space standards for the programme.
- ii. Well-equipped drawing and design studios in accordance with the recommended space requirements.

**9.3. LIBRARY AND INFORMATION RESOURCES**

The department should be provided with fully equipped library and information technology centre with computers and Internet connectivity and quick reference books, periodicals, journals and audio-visual materials. Such library and information resources will be additional to the University central library facilities.



# 10 ■ COURSE DISTRIBUTION BY LEVEL AND SEMESTER

## 100 LEVEL

S/N	Course Code	Course Title	Unit(s)	Status	LH	PH
1	GST 111	Communication in English	2	C	15	45
2	GST 112	Nigerian people and Culture	2	C	30	-
3	MTH 101	Elementary Mathematics I	2	C	30	-
4	MTH 102	Elementary Mathematics II	2	C	30	-
5	COS 101	Introduction to Computer Science	3	C	30	45
6	AMS 104	Principles of Project Management	2	C	30	-
7	AMS 101	Principles of Management	2	C	30	
8	CHM 101	General Chemistry I	2	C	30	-
9	CHM 107	General Practical Chemistry I	1	C	-	45
10	ENS 102	History of Environmental Standards	2	C	30	-
11	ENS 104	Introduction to Environmental Sciences	2	C	30	-
12	ENS 106	Global Warming and Climate Change	2	C	30	-
13	PHY 101	General Physics I	2	C	30	-
14	PHY 102	General Physics II	2	C	30	-
13	ENS 101	Introduction to Environmental Sustainability	2	C	30	-
		<b>Total</b>	<b>30</b>			



## 200 LEVEL

S/N	Course Code	Course Title	Unit(s)	Status	LH	PH
1	GST 212	Philosophy, Logic and Human Existence	2	C	30	-
2	ENT 211	Entrepreneurship and innovation	2	C	30	45
3	ENS 201	Natural Ecosystems	2	C	30	-
4	ENS 202	Introduction to Valuation	2	C	30	-
5	ENS 203	Economics of Environmental Standards	2	C	30	-
6	ENS 204	Environmental Ethics	2	C	30	-
7	ENS 205	Environmental Pollution and Degradation	2	C	30	-
8	ENS 206	Natural Resources Conservation and Environmental Management	2	C	30	-
9	ENS 207	Wild Life Conservation and Land use	2	C	30	-
10	ENS 208	Population and Environmental Change	2	C	30	-
11	STA 202	Statistics for Physical Sciences & Engineering	2	C	30	-
12	GEO 201	Introduction to Geomorphology and Soil Geography	2	C	30	-
13	GEO 205	Land Surveying	2	C	30	-
14	LAW 208	Land Law	2	C	30	-
15	SOC 212	Social Change	2	C	30	-
		<b>TOTAL</b>	<b>30</b>			





## 300 LEVEL

S/N	Course Code	Course Title	Unit(s)	Status	LH	PH
1	GST 312	Peace and Conflict Resolution	2	C	30	-
2	ENT 312	Venture Creation	2	C	30	45
3	ENS 301	Waste Management	2	C	30	-
4	ENS 302	SIWES	15	C	-	675
5	ENS 303	Environmental Law	2	C	30	-
6	ENS 307	Environmental Protection	2	C	30	-
7	ENS 309	Guidelines Establishment and Environmental Standards	2	C	30	-
8	ENS 311	Exposure Assessment	2	C	30	-
9	GEO 317	Geographic Information System and Remote Sensing	2	C	30	45
		<b>TOTAL</b>	<b>31</b>			





## 400 LEVEL

S/N	Course Code	Course Title	Unit(s)	Status	LH	PH
1	ENS 401	Research Method I	2	C	30	-
2	ENS 402	Research Method II	2	C	30	-
3	ENS 404	Research Project	6	C	90	135
4	ENS 405	Environmental Standards	2	C	15	45
5	ENS 406	Standards for Air and Water Quality	2	C	30	-
6	ENS 407	Field Work	2	C	30	45
7	ENS 408	Environmental Standards Seminar	3	C	45	-
8	ENS 411	Environmental Impact Assessment	2	C	30	-
9	ENS 413	Standard for Soil Quality	2	C	30	-
10	ENS 409	Sustainable Development	2	C	30	-
11	ENS 403	Risk Assessment and Management	2	C	30	-
12	ENS 415	Artificial Intelligence and Environmental Sustainability	2	C	30	-
		<b>TOTAL</b>	<b>29</b>			

\*LH = Lecture hours, PH = Practical hours





# COURSE DESCRIPTION

## **GST 111: Communication in English (2 Units C: LH15; PH45)**

Sound patterns in English Language (vowels and consonants, phonetics and phonology). English word classes (lexical and grammatical words, definitions, forms, functions, usages, collocations). English Sentences (types: structural and functional, simple and complex). Grammar and Usage (tense, mood, modality and concord, aspects of language use in everyday life). Logical and Critical Thinking and Reasoning Methods (Logic and Syllogism, Inductive and Deductive Argument and Reasoning Methods, Analogy, Generalisation and Explanations). Ethical considerations, Copyright Rules and Infringements. Writing Activities: (Pre-writing, writing, post writing, editing and proofreading; Brainstorming, outlining, paragraphing, types of writing, Summary, Essays, Letter, Curriculum Vitae, Report writing and Note making. Mechanics of writing). Comprehension Strategies: (Reading and types of reading, Comprehension Skills, 3RsQ). Information and Communication Technology in modern Language Learning. Language skills for effective communication. Major word formation processes. Writing and reading comprehension strategies. Logical and critical reasoning for meaningful presentations. Art of public speaking and listening. Report writing.

## **GST 112: Nigerian Peoples and Culture (2 units; C: LH30)**

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and culture; peoples and culture of the ethnic minority groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; Colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; Nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concept of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigeria people; trade, skill acquisition and self-reliance). Social justices and national development (law definition and classification. Judiciary and fundamental rights. Individual, norms and values (basic Nigeria norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts. Cultism, kidnapping and other related social vices). Re-orientation, moral and national values (The 3R's – Reconstruction, Rehabilitation and Re-orientation; Re-orientation Strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAI), War Against Indiscipline and Corruption (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.



### **MTH 101: Elementary Mathematics I (Algebra and Trigonometry) (2 Units C: LH 30)**

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

### **MTH 102: Elementary Mathematics II (Calculus) (2 Units C: LH 30)**

Function of a 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 differentiation. Methods of integration, Definite integrals. Application to areas, volumes.

### **COS 101: Introduction to Computing Sciences (3 Units C: LH 30; PH 45)**

Brief history of computing. Description of the basic components of a computer/computing device. Input/ Output devices and peripherals. Hardware, software and human ware. Diverse and growing computer/digital applications. Information processing and its roles in society. The Internet, its applications and its impact on the world today. The different areas/programs of the computing discipline. The job specializations for computing professionals. The future of computing.

#### **Lab Work**

Practical demonstration of the basic parts of a computer. Illustration of different operating systems of different computing devices including desktops, laptops, tablets, smart boards and smart phones. Demonstration of commonly used applications such as word processors, spreadsheets, presentation software and graphics. Illustration of input and output devices including printers, scanners, projectors and smartboards. Practical demonstration of the Internet and its various applications. Illustration of browsers and search engines. How to access online resources.

### **PHY 101: General Physics I (Mechanics) (2 Units C: LH 30)**

Space and time; units and dimension, vectors and scalars, differentiation of vectors: displacement, velocity and acceleration; kinematics; Newton laws of motion (Inertial frames, Impulse, force and action at a distance, momentum conservation); Relative motion; Application of Newtonian mechanics; Equations of motion; Conservation principles in physics, conservative forces, conservation of linear momentum, Kinetic energy and work, Potential energy, System of particles, Centre of mass; Rotational motion; Torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates; conservation of angular momentum; Circular motion; Moments of inertia, gyroscopes and precession; Gravitation: Newton's Law of Gravitation, Kepler's Laws of Planetary Motion, Gravitational Potential Energy, Escape velocity, satellites motion and orbits.





### **PHY 102: General Physics II (2 Units C: LH 30)**

Heat, temperature and temperature scales. Gas laws; general gas equation, thermal conductivity. First Law of thermodynamics, heat, work and internal energy. Reversibility, second law of thermodynamics, heat engines and entropy. Zero's law of thermodynamics, kinetic theory of gases, molecular collisions and mean free path. Elasticity, Hooke's law, Young's, shear and bulk moduli. Hydrostatics, pressure, buoyancy, Archimedes' principles. Bernoulli's equation and incompressible fluid flow. Surface tension, adhesion, cohesion, viscosity, capillarity, drops and bubbles.

### **CHM 101: General Chemistry I (3 Units C: LH 45)**

Atoms, molecules, elements and compounds and chemical reactions. Modern electronic theory of atoms. Electronic configuration, periodicity and building up of the periodic table. Hybridization and shapes of simple molecules. Valence Forces; Structure of solids. Chemical equations and stoichiometry; Chemical bonding and intermolecular forces, kinetic theory of matter. Elementary thermochemistry; rates of reaction, equilibrium and thermodynamics. Acids, bases and salts. Properties of gases. Redox reactions and introduction to electrochemistry. Radioactivity.

### **CHM 107: General Chemistry Practical I (1 Unit C: PH 45)**

Laboratory experiments designed to reflect topics presented in courses CHM 101 and CHM 102. These include acid-base titrations, qualitative analysis, redox reactions, gravimetric analysis, data analysis and presentation.

### **AMS 101: Principles of Management. (2 Units C: LH 30)**

Basic concepts in management. Management principles. Functions of the manager. Planning: Nature and purpose of planning. The organizing function: Department, line and staff Authority. Staffing and directing: Selection of employees and managers. Appraisal of managers. Management development. Nature of directing. Motivation. Leadership. Controlling: The control process, control technique, recent developments in the control function. The Nigerian environment: Management problems in Nigeria, challenges of indigenization, transferability of management system.

### **AMS 104 Principles of Project Management (2 Units C: LH:30)**

Build your understanding of the key foundation elements; activity areas and processes of project delivery within any project management environment. The generic tools and techniques used in project delivery, the different project management methodologies from traditional methods like waterfall to more conventional delivery methods such as agile.





**JOSTMUM-ENS 101 Introduction to Environmental Sustainability (2 units)**

Definition and pillars of environmental sustainability, evolution of sustainability, principles of environmental sustainability (The precautionary principle, biodiversity conservation, social needs, regenerative capacity, reuse, recycling, limitations of nonrenewable resources and waste generation, etc); indicators of global environmental stress (forests, soil, fresh water, marine fisheries, biodiversity, atmosphere, toxic chemicals, waste, hazardous wastes); Sustainable ethic; environmental justice; Good sustainability practice

**ENS 102: History of Environmental Standards (2 Units C: LH 30)**

History and development of environmental standards as influenced by two competing ideologies of egocentrism and anthropocentrism. Case studies of dumping of cocoa toxic waste. Rio declaration. The meanings and differences between the two worldviews. How this has led to problems and delay in establishing standards, environmentalism and the increased understanding of science and medicine, as well as advances in the measurement of factors contributing to environmental damage. How this improved measurement has allowed scientists to further understand the impact of human – caused environmental damage and destruction on human health and the biodiversity which compose the natural environment and how these developments in science and medicine have been fundamental for the setting of environmental standards.

**ENS 104: Introduction to Environmental Sciences (2 Units C: LH 30)**

Energy system in the atmosphere, biosphere, hydrosphere and lithosphere. Current environmental issues including air pollution, water pollution, drought, desertification, deforestation, earthquakes, hurricanes, floods and other environmental hazards.

**ENS 106: Global Warming and Climate Change (2 Units C: LH 30)**

Meaning of Global Warming: the long – term rise in the average temperature of the earth's climate system as a major aspect of current climate change. Causes and effects of global warming. Possible societal responses to global warming. Regional trends. Greenhouse gasses. Relationship between global warming and climate change. Climate change: definition and meaning: climate change occurs when changes in the patterns that remains in place for an extended period of time. Causes and effects/impacts of climate. Earth's energy budget and climate system. Climate variability. External forcing mechanisms: Greenhouse gasses; orbital variations; solar output; volcanism; plate tectonics; and cosmic rays.

**GST 212. Philosophy, Logic and Human Existence (2 Units C: LH 30)**

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic, the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character moulding.



## **ENT 211 – Entrepreneurship and Innovation (2 Units C: LH15; PH45)**

Concept of Entrepreneurship (Entrepreneurship, Intrapreneurship/Corporate Entrepreneurship). Theories, Rationale and relevance of Entrepreneurship (Schumpeterian and other perspectives, Risk-Taking, Necessity and opportunity-based entrepreneurship and Creative destruction). Characteristics of Entrepreneurs (Opportunity seeker, Risk taker, Natural and Nurtured, Problem solver and change agent, Innovator and creative thinker). Entrepreneurial thinking (Critical thinking, Reflective thinking, and Creative thinking). Innovation (Concept of innovation, Dimensions of innovation, Change and innovation, Knowledge and innovation). Enterprise formation, partnership and networking (Basics of Business Plan, Forms of business ownership, Business registration and Forming alliances and joint ventures). Contemporary Entrepreneurship Issues (Knowledge, Skills and Technology, Intellectual property, Virtual office, Networking). Entrepreneurship in Nigeria (Biography of inspirational Entrepreneurs, Youth and women entrepreneurship, Entrepreneurship support institutions, Youth enterprise networks and Environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

## **ENS 201: Natural Ecosystems (2 Units C: LH 30)**

Components of environment and the interaction among components, types of ecosystems (ecosystems as habitat); Principal plants in West Africa, their ecology as related to grazing; Factors affecting flora and fauna distribution at various scales. Vegetation changes through time, adaptation, succession and climax.

## **ENS 202: Introduction to Valuation (2 Units C: LH 15; PH 45)**

The nature and definition of value; Definition and purpose of valuation; the function of value economic, constitutional, geographical, environmental, political and legal basis of property value. The effect of the international situation. The capital market and the principles governing interest rates and yield market analysis. Structure and environmental surveys and reports for valuation; the mathematical background and construction of valuation table.

## **ENS 203: Economics of Environmental Standards (3 Units C: LH45)**

Land as a scarce and exhaustible resources. Location theory, economic basis of urbanization, conflicting and competing demands for land use and conservation. Relationship between land use and land value. Effect of land use and land value on the operation of price mechanism. The process of land development economics of real estate, nature and function of the urban property, urban area, financial development and economic concepts.





### **ENS 204: Environmental Ethics (3 Units C: LH 45)**

The concept of Environmental ethics and philosophy. Role of ethics in the environment. Importance of environmental ethics. Branches of environmental ethics: (i) environmental law; (ii) environmental sociology; (iii) Eco theology; (iv) ecological economics; (v) ecology; and (vi) environmental geography. Historical development of environmental philosophy in the twentieth and twenty first century; role of environmental philosophy in evaluating attitudes toward the environment; compatibility of human and environmental/ecological values; Importance of environmental philosophy within the management and design of social systems; Relevance of environmental ethics and values within the field of environmental science.

### **ENS 205: Environmental Pollution and Degradation (2 Units C: LH 30)**

Environmental Problems - Meaning and definition of environmental problem. Recognition of environmental problem. Nature, magnitude and severity of environmental problem. Causes and sources of environmental problems. Barriers to solving environmental problems. Dealing with/solving environmental: preventive measures; remedial measures. Comprehensive studies of the types, causes and consequences of environmental degradation. Highlights of environmental degradation factors (such as uncontrolled deforestation, urbanization, industrialization, wars, erosion, flood, desertification, salinity and bush fires) Protective measures to sustainably conserve and manage the environment. Sources of pollution. Major pollutants of air, soil and water; noise pollution, management of pollutants; Ozone layer depletion and the greenhouse effect.

### **ENS 206: Natural Resources Conservation and Environmental Management (2 Units C: LH 30)**

Natural resource conservation and management concepts; Natural resources: distribution of the world's natural resources and exploitation; Importance of Natural Resources Conservation and Environmental Management. The concepts of resource use and scarcity Environmental/ecological implications of threatened/endangered natural resources (i.e. forests and wildlife species); sustainable use and conservation of natural resources. Types and Possible solutions to resource and environmental challenges. Tools for creating a sustainable future for the human population challenges.

### **ENS 207: Wildlife Conservation and Land Use (2 Units C: LH 30)**

Nigerian forest wildlife and conservation policies; traditional land use practices, changes-in land- use practices, population growth and land use practices. Management planning of forest reserves, gene banks (Gene plasm), game reserves and national parks. Wildlife management needs. Problems related to wildlife conservation and management; Models and techniques for the production and analysis of forest recreation management plans. Evaluation of Wildlife Conservation and Land Use practices in the country.





### **ENS 208: Population and Environmental Change (2 Units C: LH 30)**

The concepts of Population and Environmental Change. Components of the environment, the interaction among components, types of ecosystem, ecosystem and habitats; population and environmental change. Population growth, distribution patterns, population trend and environment. Earth sustenance: Factors affecting the ability of the earth to sustain human population, Links between environmental impact of behaviour of the population and earth sustenance, earth's area of bio-productive land as a finite resource and processes for its increase or destruction.

### **STA 203: Statistics for Physical Sciences and Engineering (3 Units C: LH 45)**

Measures of Central Tendency and Dispersion (Grouped and Ungrouped): Mean-Arithmetic, Geometric, Median, Mode, Qualities, Deciles and Percentiles. Empirical Relation between Means, Median, and Mode, their Relationship and absolute Dispersion. Simple Space and Events as Sets. Finite Probability Space; Properties of Probability Statistical Independence and Conditional Probability. Tree Diagram. Bayes Theorem. Discrete and Continuous Random Variables Expectation. Independent Bernoulli Trials. Binomial Distribution and Normal Distributions. Normal Approximation to Binomial and Poisson Distributions. Hyper Geometric.

### **GEO 201: Introduction to Geomorphology and Soil Geography (2 Units C: LH 30)**

The meaning and scope of Geomorphology. Rock types, their origins and characteristics. Nature and origin of Second Order Relief Forms of the continents. Structural landforms. The meaning and scope of soil geography. Factors of soil formation. Zonal soils; azonal soils and intrazonal soils.

### **GEO 205: Land Surveying (2 Units C: LH 15; PH 45)**

Introduction to the theory of land surveying, Elementary land surveying methods, Chain and tape, prismatic compass, plane table surveying, levelling and production of site plans. Evaluation of technical reports. Identification and solutions to various plane surveying problems.

### **Law 208: Land Law (2 Units C: LH 30)**

Introduction to basic concepts: Trusts of Land, freehold and leasehold estates, legal and equitable interests. priority of interests in land, mortgages, easements and covenants. Sources of Nigerian land law, classification and types of property, ownership and possession, real property, customary land law; Nature of title to land under customary law. Nature and management of community land. Industrial rights in community land. Creation and determination of family property under customary law.



## **SOC 212: Social Change (2 Units C: LH 30)**

The concept of social change. Benefits and challenges of social change. Analysis of the nature and mechanisms of the transformation that African societies have undergone (and are undergoing) since the colonial encounter with the Western world. The colonial situation and African responses; the emergence of new economic, social, political institutions, status structures and ideological orientations, as well as the crisis of development in the post-colonial era will be explored. Theories of social change (functionalist; conflict,) and its applicability to modern societies.

## **GST 312- Peace and Conflict Resolution(2 Units C: LH 30)**

Concepts of Peace, Conflict and Security in a multi-ethnic nation. Types and Theories of Conflicts: Ethnic, Religious, Economic, Geo-political Conflicts; Structural Conflict Theory, Realist Theory of Conflict, Frustration-Aggression Conflict Theory. Root causes of Conflict and Violence in Africa: Indigene and settlers Phenomenon; Boundaries/boarder disputes; Political disputes; Ethnic disputes and rivalries; Economic Inequalities; Social disputes; Nationalist Movements and Agitations; Selected Conflict Case Studies – Tiv-Junkun; Zango Kartaf, Chieftaincy and Land disputes, Peace Building, Management of Conflicts and Security: Peace & Human Development. Approaches to Peace & Conflict Management – (Religious, Government, Community Leaders.). Elements of Peace Studies and Conflict Resolution: Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and Terrorism. Peace Mediation and Peace Keeping. Peace & Security Council (International, National and Local levels) Agents of Conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution, ADR. Dialogue b). Arbitration, c). Negotiation d). Collaboration Roles of International Organizations in Conflict Resolution. (a). The United Nations, UN and its Conflict Resolution Organs. (b). The African Union & Peace Security Council (c). ECOWAS in Peace Keeping. Media and Traditional Institutions in Peace Building. Managing Post-Conflict Situations/Crisis: Refugees. Internally Displaced Persons, IDPs. The role of NGOs in Post-Conflict Situations/Crisis.

## **ENT 312 – Venture Creation (2 Units C: LH5; PH45)**

Opportunity Identification (Sources of business opportunities in Nigeria, Environmental scanning, Demand and supply gap/unmet needs/market gaps/Market Research, Unutilised resources, Social and climate conditions and Technology adoption gap). New business development (business planning, market research). Entrepreneurial Finance (Venture capital, Equity finance, Micro finance, Personal savings, Small business investment organizations and Business plan competition). Entrepreneurial marketing and e-commerce (Principles of marketing, Customer Acquisition & Retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E-commerce business models and Successful E-Commerce Companies.). Small Business Management/Family Business: Leadership & Management, Basic book keeping, Nature of family business and Family Business Growth Model. Negotiation and Business communication (Strategy and tactics of negotiation/bargaining, Traditional and modern business communication methods). Opportunity Discovery Demonstrations (Business idea generation presentations, Business idea Contest, Brainstorming sessions, Idea pitching). Technological Solutions (The Concept of Market/Customer Solution, Customer Solution and Emerging Technologies, Business Applications of New Technologies - Artificial Intelligence (AI), Virtual/Mixed Reality (VR), Internet of Things (IoTs), Blockchain, Cloud Computing; Renewable Energy. Digital Business and E-Commerce Strategies).



### **ENS 301: Waste Management (2 Units C: LH 30)**

Meaning and definition of wastes. Characteristics of wastes. Classification of wastes. Criteria/modes of classification: (i) state of the matter (ii) degradable or non-degradable. Types of wastes. Sources of wastes, Methods of waste disposal; waste management strategies, minimisation, recycling/reuse and composting. Potentials of wastes in the agricultural, economic and energy sectors of the society. Hazardous Waste: Definition as a waste with substantial or potential threats to public health or the environment. Characteristics of hazardous wastes: ignitability, reactivity, corrosivity, and toxicity. Hazardous waste disposal/management, classification of hazardous waste. Importance of regulations for hazardous waste regulations. Regulatory measures and organizations for management of hazardous waste. Evaluation of regulatory practices and organizations for hazardous waste management in Nigeria.

### **ENS 302: SIWES (6 Units C: PH 675)**

Students are to spend twelve weeks in their places of attachment. Depending on the nature of their places of attachment, they are to participate in activities like map making, planning practices, land, soil and water resources evaluation; human and socio-economic surveys, basic operation of field and laboratory equipment and facilities, practical and operational climatology, instrumentation in geography; and any other assignment given to them by their industrial based Head of Department and Report on the entire exercise/ experience.

### **ENS 303: Environmental Law (2 Units C: LH 30)**

Basic concept of environmental standard criteria and regulation. Federal environmental laws organisation of environment protection. States edict and regulation on the environment, plant and animal quarantine. Regulations and enforcement mechanisms, violations and sanctions, levels of effectiveness and challenges in enforcement. Comparative study of environmental laws in some advanced countries. Such as USA, Canada, Thailand, and the sorts; International Laws, treaties and conventions.

### **ENS 307: Environmental Protection (2 Units C: LH 30)**

Introduction to basic concepts: Environment, Environmental protection, Shelter belt, Reclamation, Rehabilitation, Wetland, Soil erosion, sand dune, Reclamation, afforestation and reforestation. Purpose and importance of environmental protection. Soil erosion: causes, prevention and control techniques (tree planning, use of sustainable farming systems). Reclamation techniques for degraded mine sites, sand dune management (sand dune fixation with indigenous and exotic plant species), zone afforestation and reforestation programmes. Reclamation/Rehabilitation of wetland, shelter belt establishment and management, micro and macro climatic applications, The law and Environmental protection. Regulatory bodies and policies in environmental protection. Evaluation of effective protection practices in the country. The interface between environmental management and environmental protection.



### **ENS 309: Guideline Establishment and Environmental Standards (2 Units C: LH 30)**

The concepts of guidelines and environmental standards. Relationship between guidelines and standards. The guideline value as the maximum permissible concentration that guarantees an acceptable health condition or environmental quality. Types of guidelines. Actors and organizations for the establishment of guidelines: International panels of experts, Governmental organizations, World Health Organization (WHO) and other international organizations. Components of Environmental Standards: (a) application in near – ground level outdoor locations where a person might reasonably be expected to be exposed over the relevant average period; (b) protection of human health and the environment; (c) contribution to sustainable development. Main targets of environmental standards.: avoiding adverse health effects from high pollution levels, protecting the environment and contributing to sustainable development. The law and environmental standards: regulatory bodies, documents, consequences/penalties. Review of descriptive and basic inferential techniques in handling environmental data for policy making.

### **ENS 311: Exposure Assessment (2 Units C: LH 30)**

Introduction to the concept of Exposure Assessment. Purpose of designing a sound exposure assessment: (a) to assess potential health risks; differentiate between acceptable and unacceptable exposures; control unacceptable exposures; (b) determine needs and priority for health controls; (c) ensure and demonstrate compliance with governmental and other exposure guidelines; (d) establish and document historical record of exposure levels, communicate exposure monitoring results. Major steps in exposure assessment strategy. establish exposure assessment strategy; basic characterization; occupational exposure; exposure assessment; information gathering: exposure monitoring, exposure modelling, biological monitoring, epidemiological data generation; health hazard controls: engineer controls, administration control, and personal protection equipment. reassessment; communication and documentation.

### **GEO 317: Geographic Information System and Remote Sensing II (2 Units C: LH 15; PH 45)**

Introduction to Spatial Database Management Systems. Introduction (Data, Information, File system vs DBMS, Data models, Hardware and software requirements, Database Management Systems, Database languages, Database Architecture, users and administrators, Classification of Database Management Systems. Relational Data Model (Relational model, Data Structure, Constraints, Key, Codd's Rule, Relational Algebra, Fundamental operations, Additional operations, Extended operations Null values. SQL (SQL, Data Definition, Basic structure of SQL queries, set operations, Aggregate, Functions, Null values, Nested sub queries, Complex queries, Views, Embedded SQL, Dynamic SQL, Triggers. Database Design and Management (Design process, Entity Relationship Model, Constraints, EER, Diagrams, Atomic domain and First Normal Form, Functional Dependency, Decomposition using Functional dependencies, Normalization using Multi-Valued Dependencies and Join Dependencies, Basic concepts of file organizations, indexing and hashing, Database recovery techniques, Database Security, Handling Spatial Database. Accessing Data Using ADO.Net And Vb.Net (ADO.Net Object Model using OLE DB managed provider, Other data providers, Accessing XML data, Building Windows). GIS and the information age, Capabilities of GIS, Spatial data and their sources for GIS analysis, Raster and Vector data, Data Entry, GIS analysis and modelling data issues and problems.



### **ENS 401: Research Method I (2 Units C: LH 30)**

Conceptual definitions of research and research methodology. Types of research: Scientific and non-scientific. Types of scientific research methodology such as experimental, survey, case study and historical. The concept and importance of research in Environmental standards. methodology of Environmental Standards research. Qualitative and quantitative researches. The research process, types and sources of data and handling techniques. Layout of the research report: guidelines for the Cover page and preliminary pages, background of the study, research problem selection, meaning and formulation of research questions, research objectives and hypothesis, scope/delimitation of the study, significance of the study, literature review. Meta analysis in literature selection. Conceptual literature/framework. Theoretical literature. Empirical literature. Gap and value addition. Research methodology (Theoretical framework, area of the study, population, sample and sampling techniques. Instrument for data collection and description. Validation and reliability of instruments. Instrument administration. The research model. Analytical tools/ scaling and measurement techniques and procedure. Sources of data. Handling primary and secondary data in research. Problem of missing data. Data interpolations and extrapolations. Presentation, interpretation and discussion of findings. Summary. Conclusion. Recommendation. Policy implications. Contribution to knowledge. Limitation of the study. Suggestion for further research. References. Appendices. Prospects and problems of environmental research in Nigeria.

### **ENS 402: Research Method II (2 Units C: LH 30)**

Qualitative and quantitative research methods. Methods of data collection. Interview; types, objectives, recording. Questionnaires: types, development. Design of experiments (laboratory procedures). Factors guiding the selection of quantitative or qualitative method for data collection and analysis. Description of materials and methods in experimental research. Hypothesis; formulation of hypothesis; testing of hypothesis; concept of significance. Formulation of models. Methods of data analysis; types, choice and description. Interpretation of results. Computer based analysis. Theoretical, Methodological and Analytical frameworks in research. Referencing styles: MLA, Classic style and APA. Referencing software, Communication skills and oral presentation (defence) of research projects, preparation, skills and use of power points for presentation. Longitudinal framework for presentations.

### **ENS 403: Risk Assessment and Management (2 Units C: LH 30)**

Meaning and definition of Risk Evaluation. Risk Characterization: the qualitative and/or quantitative estimation, attendant uncertainties, probability of occurrence and severity of known or potential adverse health effects on a population based on hazard identification, hazard characterization and exposure assessment. Requirements for risk characterization such as mathematical knowledge (as in modelling data), knowledge of the process under consideration, and microbiological knowledge and expertise is invariably needed. Stages of risk characterization: (i) combining previous MRA steps; (ii) summarizing the risk; (iii) variability in risk; (iv) validation against experience. Determination of risk management priorities through establishment of qualitative and /or quantitative relationships between benefits and associative risks. Risk evaluation process: identification, probability and impact, moment of risk, treatment, secondary risk, residual risk, and monitoring and review. Techniques of reduction and management of environmental risks: substitution, information about the safe use and disposal of agents to the public and users, and limiting the availability of the agent. Elementary Risk Sensitivity analysis.



**ENS 404: Research Project (6 Units C: PH 270)**

The student is expected to undertake research work on any chosen topic as a special area of study as it pertains to the environment and environmental management. Students are required to demonstrate ability for independent research, which makes contribution to knowledge with some guidance of an academic staff throughout the project. The examination will be conducted with a viva, which will be attended by the external examiner.

**ENS 405: Environmental Standards(2 Units C: LH 15; PH 45)**

The concept and importance of environmental standards. Steps in setting environmental standards: evaluation of the specific risk, calculation of the expected value of the occurrence of the risk, classification of possible types of damage (i) changes due to physiochemical damages, (ii) ecological damages in plants and animals, and (iii) damages to human health, establishment of an acceptable risk, in view of the expected collective benefit and the balancing process. Steps in the balancing process: (i) to establish objectives that serves the protection of life, health and environment, and allows a rational allocation of social resources, (ii) studying the possible outcomes of implementing these objectives, and (iii) considering social costs or damages, which will arise when any of the available options are not further pursued. Evaluation of environmental standards in Nigeria.

**ENS 406: Standards for Air and Water Quality(2 Units C: LH 30)**

The concept of air quality standards as levels of air pollutions prescribed by regulations that may not be exceeded during a specified time in a defined area. Air quality parameters: Air quality index (AQI) used by government agencies: Uses and types. The primary sources of information on air quality standards, criteria and policies: the relevant local, state and central organization that have a mandate for overseeing the air resources of the study area.: Air environmental setting; Air impacts; prediction of air impacts, impact assessment; and impact mitigation. Water quality as the chemical, physical, biological and radiological characteristics of water. The most common standards used to assess water quality: health of ecosystems, safety of human contact and drinking water. Setting standards: Role of agencies that make political and technical/scientific decisions about how the water will be used. Categories: the parameters for water quality and how they are determined by the intended user. Human consumption, industrial and domestic use of water, environmental water quality, and agricultural water quality.

**ENS 407: Field Work (3 Units C: LH 30; PH 45)**

Students will be exposed to first hand practical experience and application of classroom-based learning on a variety of concerns in environmental standards. At the end of the field work students will be able to demonstrate knowledge acquired from the Field Work in proffering solutions to environmental-related problems.

**ENS 408: Environmental Standards Seminar (3 Units C: LH 45)**

Students are expected to choose topics on issue relating to the environment. Students will be required to present a seminar on the chosen topic.



### **ENS 409: Sustainable Development (2 Units C: LH 30)**

Natural Resources Conservation and Environmental Standards -Natural resources, concepts and definitions; Natural resources exploitation; Environmental/ecological implications of threatened/endangered natural resources (i.e., forests and wildlife species); sustainable use and conservation of natural resources. Sustainable Development: the organizing principle for meeting human development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and system services upon which the economy and society depend. history of sustainability and sustainable development, definitions and scope of sustainable development, sustainable development goals (SDG): Concept, UN decade for sustainable development, sub – groups: environmental (or ecological), Agriculture, Economics, Environmental Economics, Energy, Manufacturing, Technology, Transport, Business, Income, Politics, Architecture and Culture. Resettlement Planning. tools for combating human population challenges for sustainable development.

### **ENS 410: Monitoring, Inspection and Enforcement (2 Units C: LH 30)**

Introduction to the concepts of Monitoring, Inspection and Enforcement. Monitoring: the monitoring of activities or agents that have to meet environmental standards: Provisions for the verification of compliance with standards; The need to determine accurately and rapidly extent of compliance by agents, the need for a coordinated monitoring process to reduce the overall costs of regulation and improve outcomes. Inspection: Importance, methods, processes. The place of inspection in achieving the purpose of environmental standards, and how to undertake effective inspection. Enforcement: strength and credibility behind the policy for greater effectiveness. Strength derives from both the likelihood of inspection and the level of fines. Emphasis in this component should be on: (i) the need for enforcement in environmental standards, and (ii) how best to undertake enforcement, usually “appropriate penalties” arising from inspection in the field.

### **ENS 411: Environmental Impact Assessment (3 Units C: LH 15; PH 90)**

The concept of environmental impact assessment. Environmental impact of human actions. Response of society to environmental changes. Bio-geophysical and socio-economic impacts. Administrative procedures in planning/decision making of environmental impact assessment (EIA). Contents of EIA (Definition, Steps in EIA, Screening and Scope, Impact Mitigation Techniques and Mitigation Hierarchy Alternatives, Report Writing Format and Follow-Up Programmes). Methods for identifying, predicting and interpreting impacts/effects and inspection procedures. Conceptual framework for EIA using simultaneous models and policy analysis. Socio-economic methods or EIA with respect to current socio-economic environment and methods for deriving impacts.



### **ENS 412: Environmental Audit(2 Units C: LH 15; PH 45)**

Definition, general principles of environmental monitoring. Organisation of auditing and monitoring programmes for site and resource specific strategies. Classification of monitoring techniques and use (physical, chemical, biological radioactive) global sources, sinks and transport (mass balance) of both man-made and natural atmospheric trace components, Ocean- atmosphere interactions, reversible effect of human activities on the global environment like the greenhouse effect, climate change, depletion of stratosphere ozone layer, acid rain. Air pollution meteorology, chemistry and biology. Atmosphere dispersion models. Elements of air pollution control. Sampling and air monitoring techniques. Mechanism of pollutant interaction with soil and vegetation. General principles of biotesting, aquatic toxicity, types, bio, assays, data analysis and interpretation.

### **ENS 413: Standard for Soil Quality (2 Units C: LH 30)**

Meaning and definition of soil quality. Concepts of soil quality and their significance. Development of framework for evaluation of soil quality. Soil quality index; Characteristics of the quality and types of soil. Differences between soil quality and soil health. Importance of setting soil quality standards. Procedures for setting standards for soil quality. Agencies for setting soil quality standards. Evaluation of policies and its effectiveness on soil quality standards in Nigeria.

### **ENS 415 Artificial Intelligence and Environmental Sustainability (2 units)**

Definition and evolution of AI; basic tools of AI as applied to environmental sustainability, potential risks and challenges associated with AI, responsible use of AI



Table 22: FACULTY MEMBERS FOR ENVIRONMENTAL SUSTAINABILITY [B.Sc. (HONS)]

S/N	NAME OF ACADEMIC STAFF	AREA OF SPECIALIZATION	DISCIPLINE	QUALIFICATIONS	RANK	EMPLOYMENT STATUS	MODE OF APPOINTMENT
<b>CORE STAFF</b>							
1.	Prof. R. A. Wuana	Analytical and Environmental Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
2.	Prof. R. Sha'Ato	Analytical and Environmental Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
3.	Prof. L. A. Nnamonu	Agrochemical Technology	Chemistry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
4.	Dr. M.S. Ugbaa	Climate Change and Biotechnology	Plant Breeding and Genetics	B.Sc., M.Sc., Ph.D	Lecturer I	Full Time	Tenure
5.	Mrs. S. M. Lan	Environmental Toxicology & Pollution Management	Environmental Management	B.Sc., M.Sc.	Assistant Lecturer	Full Time	Tenure
<b>ADJUNCT STAFF</b>							
6.	Prof. E.J. Ekefan	Crop and Environmental Protection	Plant Pathology	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
7.	Prof. J. A. Ogwuche	Environmental Management	Geography	B.Sc., M.Sc., Ph.D	Professor	Part-Time	Visiting
8.	Prof. S. A. Shomkegh	Environmental Management	Forestry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
9.	Prof. J. I. Amonum	Forest Management	Forestry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
10.	Prof. T. N. Tee	Forest Economics and Management	Forestry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
11.	Prof J. T. Orsar	Wildlife nutrition	Wildlife Management	B.Sc., M.Sc., PhD	Professor	Full Time	Tenure
12.	Dr. A. Tyovenda	Environmental/Radiation Physics	Physics	B.Sc., M.Sc., Ph.D	Associate Professor	Full Time	Tenure
13.	Dr. P. U. Ancha	Forest Economics	Forestry	B.Sc., M.Sc., Ph.D	Associate Professor	Full Time	Tenure
14.	Prof. U. A. Itodo	Environmental Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Associate Professor	Full Time	Tenure
15.	Dr. S. I. N. Agera	Forest Biology and Silviculture	Forestry	B.Sc., M.Sc., Ph.D	Associate Professor	Full Time	Tenure



16.	Prof. E. T. Tembe	Wood Technology	Forestry	B.Sc., M.Sc., Ph.D	Professor	Full Time	Tenure
17.	Dr. S. Ande	Analytical Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Associate Professor	Full Time	Tenure
18.	Dr. I. Ahemen	Energy Physics/Nano-materials	Physics	B.Sc., M.Sc., Ph.D	Associate Professor	Full Time	Tenure
19.	Dr. T. Sombo	Environmental/Medical Physics	Physics	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
20.	Dr. Z. Agbende	Analytical Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
21.	Dr. T. Azua	Environmental Sciences	Biological Sc.	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
22.	Dr. E. T. Ikyagba	Forest Conservation and Management	Forestry	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
23.	Dr. J. I. Uloko	Wildlife Ecology & Biodiversity Management	Wildlife Management	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
24.	Dr. A. O. Ikongbe	Aquatic Pollution	Fisheries	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
25.	Dr. J. A. Jande	Remote Sensing and GIS	Forestry	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
26.	Dr. T. Tivde	Mathematical Modeling/Simulations	Mathematics	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
27.	Dr. S. M. Tongu	Analytical Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
28.	Dr. C. O. Eche	Agro- and Environmental Nematology	Crop and Environmental Protection	B.Agric., M.Sc., Ph.D.	Senior Lecturer	Full Time	Tenure
29.	Dr. A. A. Jimin	Weed Science	Crop and Environmental Protection	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
30.	Dr. E. E. Ekoja	Agric. Entomology	Crop and Environmental Protection	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
31.	Dr. D. O. Ekhuemelo	Forestry Production and Products	Forestry	B.Sc., MSc., PhD	Senior Lecturer	Full Time	Tenure



32.	Dr. P. O. Onuwa	Analytical Chemistry	Chemistry	B.Sc., M.Sc., Ph.D	Lecturer I	Full Time	Tenure
33.	Dr. I. B. Chenge	Forest Biometrics & Remote Sensing	Forestry	B.Sc., M.Sc., Ph.D	Senior Lecturer	Full Time	Tenure
34.	Mr. B. U. Origbo	Environmental Management	Forestry	B.Sc., M.Sc.	Lecturer II	Full Time	Tenure
35.	Dr. J. A. Amhanyunonsen	Geography	Geography	B.Sc., MSc., PhD	Industry faculty	Part Time	Visiting





**JOSEPH SARWUAN TARKA  
UNIVERSITY, MAKURDI**  
(Formerly FEDERAL UNIVERSITY OF  
AGRICULTURE MAKURDI)