NATIONAL OPEN UNIVERSITY OF NIGERIA

DEPARTMENT OF PURE AND APPLIED SCIENCES

FACULTY OF SCIENCES

UNDERGRADUATE STUDENT HANDBOOK
(2021-2023)

NATIONAL OPEN UNIVERSITY OF NIGERIA
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JABI, ABUJA

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Published by **NOUNPRESS**
March 2021

Revised 2020

ACKNOWLEDGEMENT

This handbook, the first to be produced in the Department of Pure and Applied Sciences for the department's undergraduate students, is a product of the efforts and contributions of the Curriculum Committee especially the Chair of that committee, Mr. Abiodun E. Adams and support of several persons in the university. Our gratitude goes to: The Vice-Chancellor, Professor Uba Abdalla Adamu, for the moral and financial support towards the production of this handbook; the Dean of the Faculty of Sciences, Professor Monioluwa Olaniyi, the Registry, Academic Office, Information and Communication Technology Directorate of the University, and programme units within the faculties for their cooperation in providing information.

The content of this handbook was culled from that of the former School of Science and Technology. The adaptation into this handbook for undergraduates of Pure and Applied Sciences was majorly done by Mr. Abiodun E. Adams who is the Chair, Faculty of Science Curriculum Development committee and who is incidentally a member of academic staff of the department, with contributions from the Head of department, Dr. Emeka Ogoko and the Dean of the Faculty, Professor Monioluwa Olaniyi.

I also acknowledge all the other members of staff of the department for their direct and indirect contributions

The handbook is designed for easy reference, and contains concise information on the Department and Programmes. It is hoped that the undergraduate students will find this book quite useful.

PREFACE

This is the second edition of the student handbook for the department of Pure and Applied Sciences. In this edition there has been an update of the staff list (both academic and administrative staff) in line with the new developments in the departments.

The latest modification of the OPP and DPP of the various programmes in the department have been made in line with the prevailing NUC benchmark as well as the prevailing regulations in the university.

The sections for each of the BSc. programmes have been stated on the table of contents for easy reference.

Special acknowledgment to the Mr. Abiodun Adams for the thorough work done in the first Edition which made this review an easy task

Make the handbook your companion to guide you throughout your sojourn in the institution and you shall be on the right part.

Dr. Uduak Aletan (2020)

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VISION AND MISSION STATEMENTS OF THE NATIONAL OPEN UNIVERSITY OF NIGERIA

Vision Statement

To be regarded as the foremost University providing highly accessible and enhanced quality education anchored by social justice, equity, equality and national cohesion through a comprehensive reach that transcends all barriers.

Mission Statement

To provide functional, cost effective, flexible learning which adds lifelong value to quality education for all who seek knowledge.

NOUN ANTHEM

National Open University of Nigeria
Determined to be the foremost university in Nigeria
Providing highly accessible
And enhanced quality education
Anchored on social justice
Equity, equality and national cohesion

Come to NOUN
For quality, cost effective and flexible learning
That adds lifelong value
For all who yearn
For quality education
And for all who seek knowledge

VISION STATEMENT OF THE FACULTY OF SCIENCES

- Our vision is to be the foremost Faculty in terms of quality and relevance of curriculum, research and instruction, making science training available to and accessible by all at competitive yet affordable cost on the open distance learning platform.

Mission Statement of the Faculty of Sciences

The Faculty of Sciences is committed to:

- providing a comprehensive and relevant distance learning curriculum in science based programmes
- producing well-informed graduates for careers in academia, industry and government
- conducting high-quality research in science-related disciplines
- Encouraging and supporting strong cross-disciplinary, interdisciplinary, and multi-disciplinary collaborations both within and beyond the University (nationally and internationally)

Core Values of the Faculty of Sciences

Our Core Values in the Faculty of Sciences are:

Excellence:	We will continue to set our sights and standards high.
Achievement:	We will capitalise on our distinctive strengths and unique opportunities to excel in an increasingly competitive world.
Collegiality:	We will maintain an inclusive and supportive yet challenging environment that attracts the best students, staff and faculty, working together with mutual respect.
Innovation:	We will be creative in our efforts to achieve our objectives.

Relevance: We will seek to continually improve our programs, ensuring that they are appealing and well suited to the society and development, equipping our graduates for successful career and future.

Collaboration: We will initiate mutually beneficial relationships with a variety of partners to ensure development of facilities, programmes and research for community development and service.

Sustainability: We will maintain our self-sufficiency by seeking efficiencies and being entrepreneurial in our approach to challenges.

FOREWORD FROM THE VICE-CHANCELLOR

The student handbook is an important document required for accreditation exercise. It contains all the necessary information on students' registration, available courses, course contents, examinations and staff.

The National Open University of Nigeria is the sole unimodal Open and Distance Learning Institution in Nigeria. Due to its uniqueness, the handbook must contain a brief history and modus operandi of the institution as well as the organisational structure of the university.

It is imperative to avail all current and prospective students with information on quality assurance, strategic plan of the university at large and the objectives and philosophy of the school.

All these have been succinctly outlined in the document which has been put together by the Faculty of Sciences. It is compulsory for every student to have a copy of this handbook. This edition is a review of the university wide volume which was given to the students upon registration. The Faculty of Sciences Handbook is due for review after five years. This means that on or before the expiration of this period, there must be a review having in mind developments in the faculty.

I therefore recommend this handbook to all students and other persons interested in the programmes run by the Faculty of Sciences.

Professor Olufemi Peters
Vice-Chancellor

WELCOME ADDRESS FROM THE DEAN

Science is the bedrock of development for every nation. It is with this understanding that the blueprint that set up the National Open University of Nigeria included as one of the cohorts of schools, science and technology.

The Faculty started as the School of Science and Technology at inception, consisting of programmes in Agricultural Sciences, Health Sciences, and Science and Technology.

In 2013 the then School of Science and Technology birthed two other Schools and was hence split into three in line with the programmes mounted. Consequently, we had School of Agricultural Sciences, School of Health Sciences and School of Science and Technology without defined departments. In 2016, the University adopted the faculty system with defined departments and the School of Science and Technology metamorphosed into the Faculty of Sciences.

The Faculty of Sciences has four departments namely; Department of Computer Science, Department of Environmental Sciences, Department of Mathematics and, the department of Pure and Applied Sciences. The handbook gives an overview of the different programmes mounted by the different departments of the Faculty. It provides a summary of the course outline and details of the curriculum to cover. It also provides information on graduation requirements and it is a must have for any serious-minded student of the Faculty of Sciences. The faculty handbook also contains information related to student registration, choice of courses, programme duration, graduation requirements, together with other relevant matters that will enhance the students understanding of the Faculty and its programmes as well as job prospects. Contained also in the handbook, are information that deal with brief history of National Open University of Nigeria. It is therefore quite expedient that all students of the Faculty of Sciences have a copy of this handbook, which will also assist them in decision making. For those who may be planning to undertake a

programme in our faculty of excellence, this handbook also comes in handy.

Our programmes are tailored towards lifelong learning because we believe there should be no impediment to learning. Programmes curricula are geared at ensuring access to as many people as qualify to pursue knowledge in the science domain and enhance national development. I therefore, welcome you to the Faculty of Sciences, the faculty of excellence and the bedrock of national development.

Professor Saaheed O. Ajibola
Dean, Faculty of Sciences

WELCOME ADDRESS FROM THE HEAD OF DEPARTMENT

Welcome to the Department of Pure and Applied Sciences. The University adopted the Faculty system in 2016, which gave birth to the Department of Pure and Applied Sciences in 12th July, 2016. The Department of Pure and Applied Sciences emerged from the merger of Biology Unit, Chemistry Unit and Physics Unit of the former School of Science and Technology.

The department currently has three undergraduate programmes namely, B.Sc. Biology, B.Sc. Chemistry and B.Sc. Physics.

B.Sc. Biology Programme commenced in 2012/2013 academic session. The programme provides constituent courses to other programmes in the Faculty of Sciences and relevant Science Education Programmes of the Faculty of Education. The programme is intended for students who are primarily interested in careers as professional biologists or wish to have a thorough grounding in biology in preparation for professional or graduate school in biology and other related disciplines.

B.Sc Chemistry Programme commenced in 2012/2013 academic session. The programme provides constituent courses to other programmes in the Faculty of Sciences and relevant Science Education Programmes of the Faculty of Education. B.Sc Chemistry Programme is intended for students who are primarily interested in careers as professional chemists or wish to have a thorough grounding in chemistry in preparation for professional or graduate school in chemistry and other related disciplines.

B.Sc Physics Programme commenced in 2012/2013 academic session. The programme also provides constituent courses to other programmes in the Faculty of Sciences and relevant Science Education Programmes of the Faculty of Education. B.Sc Physics Programme is intended for

students who are primarily interested in careers as professional physicists or wish to have a thorough grounding in physics in preparation for professional or graduate studies in physics and other related disciplines.

B.Sc. Biology and B.Sc Physics programmes were given full accreditation while B.Sc. Chemistry given interim in August 2018.

This handbook consists of the following information:

- Summary of the course outline and details of curriculum to cover
- Information pertaining to student registration, choice of courses, programme duration, graduation requirement, job prospects for graduate students and a lot of other relevant information aimed at improving the overall students understanding of the department and its programme.

Students are therefore encouraged to not only have a copy of the handbook, but to also periodically study it so as to be appropriately and adequately guided in key decisions making. These Programmes seek to promote science by developing graduates who would acquire knowledge and skill through hands-on experience and supporting use of technologies such as virtual and dry laboratories, as well as other ODL infrastructure to ensure no barrier to learning and access.

Dr. Maureen Nkemdilim Chukwu
HOD, Pure and Applied Science

PART 1 INTRODUCTION

1.1 About the National Open University of Nigeria

The National Open University of Nigeria was first established on the 22nd July, 1983 by Act No. 6 of the National Assembly. It is the first and only single-mode university in Nigeria that is dedicated to the provision of higher education through the Open and Distance Learning (ODL) mode. Shortly after the National Open University Act of 1983 by which the University was established, it was on the 25th April 1984 suspended. In the Nation's search for a means of providing education, which is functional, cost effective and flexible, for all her citizens, a National Workshop on Distance Education was held in September 2000. Consequently, eighteen years after the suspension, the University was resuscitated as the National Open University of Nigeria (NOUN) on 1st October 2002

NOUN operates the open and distance education system which the National Policy on Education describes as a system that encompasses education for all, education for life, lifelong learning, and self-learning among others. The rebirth of NOUN, which has served as a springboard for ODL in Nigeria, is a demonstration of the country's irrevocable and unwavering commitment to education as a tool for personal and national development, and as a fundamental human right of her citizens.

The University's overall goal is to make education available to all who have the ability, and are willing and ready to benefit from functional and quality education provided through flexible and affordable distance learning.

1.2 Studying through Open and Distance Learning at NOUN

Open and Distance Learning is a mode of learning that is characterised by the separation of the teacher in space and or time from the learner, and enables learners to exercise choice over their learning regarding what, how, where they learn, pace of learning, support for learning, when and where assessment of learning takes place. NOUN's approach to ODL has the following features:

Openness: Removal of all barriers or restrictions to learning that characterise traditional education. They include restrictions by age and location of study.

Flexibility of learning: The emphasis is on learning rather than teaching. It is students' responsibility to choose how they want to study, learn anywhere, anytime, and at their own pace mediated by technology. In other words, it is learner-centred rather than teacher-centred. Programmes can be completed up to double the normal duration of programmes.

Accessibility: Study centres are established at state and community levels, and special centres at prison, paramilitary agencies and military units. These are among the many efforts to reach all segments, communities and individuals in the society who require a continuation of their education.

Affordability: Removal of financial barriers by allowing learners to pay as they study and by providing materials and other services on a cost recovery basis.

Multi-Modal Instructional Delivery: This delivery method utilises a variety of media and technologies that is most easily available to learners. These include course materials in print and on the web as e-Courseware. They are also available in compact discs and in OER formats.

The instructional mode of delivery and learning provides the opportunity for learners who are employed or self-employed to acquire knowledge, skills and techniques relevant to their present employment or to improve their academic qualifications and aspire for higher positions in their jobs.

PART 2: ABOUT THE FACULTY OF SCIENCES

2.0 Introduction

The Faculty of Sciences is one of the faculties in the National Open University of Nigeria. It comprises four departments namely:

i. Computer Science
ii. Environmental Sciences
iii. Mathematics
vi. Pure and Applied Sciences

These departments offer different programmes at both undergraduate and postgraduate levels. The faculty has a total number of 52 academic staff and 9 non-academic staff. We value excellence, achievement and innovation. Our dream is to provide leadership in readily accessible science training and dynamically sustaining it.

Our core values in the Faculty of Sciences are as follows:

a. Excellence: We will continue to set our sights and standards high.
b. Achievement: We will capitalise on our distinctive strengths and unique opportunities to excel in an increasingly competitive world.
c. Collegiality: We will maintain an inclusive and supportive yet challenging environment that attracts the best students, staff and faculty, working together with mutual respect.
d. Innovation: We will be creative in our efforts to achieve our objectives.
e. Relevance: We will seek to continually improve our programs, ensuring that they are appealing and well suited to the society and development, equipping our graduates for successful career and future.
f. Collaboration: We will initiate mutually beneficial relationships with a variety of partners to ensure development of facilities, programmes and research for community development and service.

g. Sustainability: We will maintain our self-sufficiency by seeking efficiencies and being entrepreneurial in our approach to challenges

2.1 Historical Background

The Faculty of Sciences was originally founded as the School of Science and Technology at resuscitation of the university in 2002. In 2013, two other schools were calved out of it and three schools resulted namely: School of Science and Technology, School of Health Sciences and School of Agricultural Sciences. Subsequently, in July, 2016, when the university adopted the faculty system with defined departments, the School of Science and Technology was renamed Faculty of Sciences comprising of four Departments namely:

1.	Department of Computer Science	(CSD)
2.	Department of Environmental Sciences	(ESD)
3.	Department of Mathematics	(MTH)
4.	Department of Pure and Applied Sciences	(PAS)

2.2 Programmes

The Faculty of Sciences is located on the ground floor of the Faculty Block in National Open University Headquarters at Plot 91Cadstral Zone, Nnamdi Azikiwe Expressway Jabi, Abuja. It is currently administering and coordinating eight undergraduate programmes and two postgraduate programmes namely:

i. B.Sc. Information Technology
CSD
ii. B.Sc. Computer Science
CSD
iii. B.Sc. Mathematics
Maths
iv. B.Sc. Mathematics with Computer Science
Maths
v. B.Sc. Environmental Science and Toxicology
EST

iv. B.Sc. Biology
PAS
vii. B.Sc. Chemistry
PAS
viii. B.Sc. Physics
PAS

2.3 Administration

The faculty has a total number of seven professors, two associate professors and forty-seven academic staff in ranks ranging from senior lecturer to assistant lecturers, in different areas of specialisation.

The faculty is headed by Professor Monioluwa Omolara Olaniyi, the Dean while the administrative unit is managed by the Faculty Officer (FO), Ms Mabel Madu, a Principal Assistant Registrar. The FO oversees the day to day running of the Faculty's facilities, and provides materials needed by staff to execute their duties. Each of the four departments is headed by academic staff as follows:

1. Department of Computer Science Dr. Frank Osang
2. Department of Environmental Sciences Dr. Emily Iduseri
3. Department of Mathematics Dr. Akeem Disu
4. Department of Pure and Applied Sciences Dr. Maureen Chukwu

The Faculty of Sciences holds its Academic Board meeting, statutorily, every month, where issues bordering on academic and student matters, the progress of the faculty and staff are discussed. All Academic staff are members of the Board while the head of administrative unit is the Secretary to the Board.

2.4. Background of the Department Pure and Applied Sciences

The University adopted the Faculty system in the year 2016, which gave birth to the Department of Pure and Applied Science in 12th July, 2016. The Department of Pure and Applied Science emerged from the merger of Biology Unit, Chemistry Unit and Physics Unit of the former School of Science and Technology.

The department currently has three undergraduate programmes namely, B.Sc. Biology, B.Sc. Chemistry and B.Sc. Physics.

B.Sc. Biology Programme commenced in 2012/2013 academic session. The programme provides constituent courses to other programmes in the Faculty of Sciences and relevant Science Education Programmes of the Faculty of Education. The programme is intended for students who are primarily interested in careers as professional biologists or wish to have a thorough grounding in biology in preparation for professional or graduate school in biology and other related disciplines.

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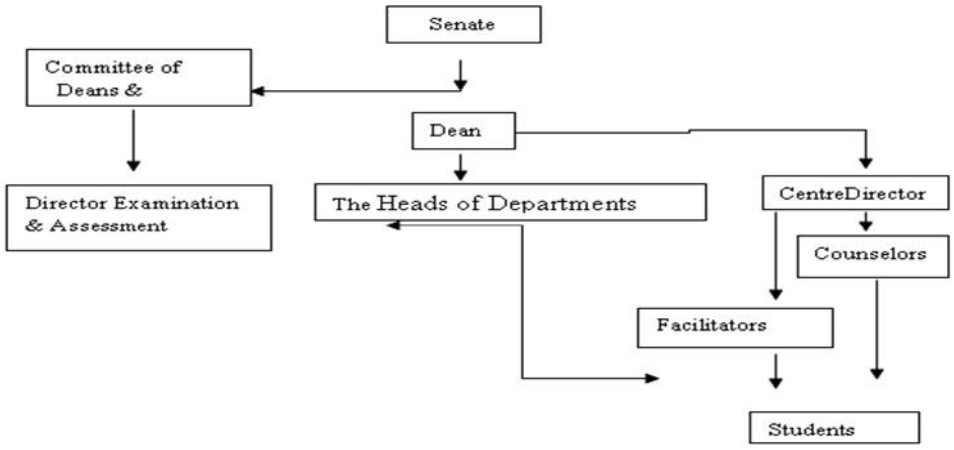
2.5. Organisational Structure

Below is the general organisational structure:



2.6 How Staff are involved in the Decision-Making Process and in General Administration

The department is coordinated by a Head of Department, supported by the academic and non-academic staff. The department conducts regular meetings, monthly academic board meetings and emergency meetings involving all the staff of the department to deliberate over departmental issues. Some members of staff are representatives of the department at various committees within the university.

2.7 Students' Welfare

Handling of academic grievances depends on University-wide SERVICOM charter as shown in the table below:

Charter of Service of the National Open University of Nigeria in response to Students' Needs					
S/N	**Types of Services**	**Delivery Target**	**Redresses available to the Students**	**Official(s) Responsible for Handling Complaints in order of Sequence**	**Implementation Strategy**
1	**Award of:** Diploma 1st Degree Post Graduate Diploma Masters' Degree	2 years full time – 2 years flexible mode 4 years full time,8years flexible mode 1 1/2 years full time-2/3years flexible mode 1 1/2 years full time - 2/3years flexible mode	**Petition the** • Centre Director Dean • University Senate • Vice Chancellor • University Council • Seek redress at the Law Court	• The Centre Director • The programme Leader • The Dean • The University Senate • The Vice Chancellor • The University Council	

				• Seek redress at the Law Court	
2	**Enquiries:** Telephone E- mail Correspondences	 Within 1 day 3 working days 14 working days	• The Dean • The Chief Public Affairs Officer	• The Dean/Director	By making sure that all phones are working and manned between the hours of 8.00 a.m.– 4.00 p.m.
3	Admission Process	Within 8 weeks of conclusion of sales of forms	• The Centre • Registrar • Dean/Director	• The Dean	Matching students' qualifications with admission criteria
4	Students' Orientation/ Registration	Within 4 weeks	• The Dean/Director • Registrar • The Centre Director	• Registrar	Provide detailed information about course characteristics, fees,
5	Change of Programme	Within 1 week	• Dean/Director • The Centre	• The Dean	Matching students' qualifications with

			• Director		admission criteria
6	Addition and Dropping of Courses	Within 1 week	• The Study Centre Director	• The Student Counsellor • Study Centre Director • The Dean • Programme Leader • Course Coordinator	To be completed within acceptable period. Otherwise students pay specified levy after period of grace.
7	TMAs and Tutorial classes	Within 2 weeks	• Study Centre Director • Programme Leader • Course Coordinator	• Centre Director • Programme Leader • The Dean	i) Effective monitoring of scheduled times ii) Effective monitoring of personnel for tutorial classes
8	Administration of Examinations	Within stipulated time	• The Dean/Director	• Centre Director • Programme Leader • The Dean	i) Ensure Quality ii) Security iii) Mode of delivery

9	Collation of Results	Within 4 weeks of Examination	• The Study Centre Director • The Dean	• Programme Leader Course Coordinator	Release results promptly through the academic Registry.
10	Review of Programmes/ Courses	Normally every 5 years	• The Dean/Director	• Course Coordinator • Programme Leader • Dean	i) Actual review, every 5 years. ii) Errors detected in any course material would be corrected immediately via addendum in print and electronically.
11	Organisation of Field Trips/ Professional Experience	Within 4 weeks	• Study Centre Director • The Dean/Director	• Course Coordinator • Programme Leader • The Dean/Director	Ensure early and prompt contact with industries/ institutions for learners' placements

2.8 Examination

Each academic staff prepares questions based on available materials. More often than not, senior members of staff internally moderate items and marking schemes prepared by junior ones and enlighten them the more with regards to phraseology, clarity and content of each course. Then the questions are passed on to the examination coordinator for the Faculty, who then sends them to the Directorate for Examinations and Assessment of the University.

The academic staff and, in some cases, invited experts in relevant fields, prepare both Tutor-Marked assignment (TMA) questions and End of Semester Examination (ESE) questions. These are further internally moderated with the accompanying marking schemes before they are given to the students. Three TMAs of ten questions each are given for each course; students are required to answer all and have them graded. The TMAs constitute 30% of the course final grade and also serve as the continuous assessment for the course. **The question papers for the final year students are moderated by university appointed external examiners in the specific fields and specialization before the questions are administered.** The End of Semester Exams (ESE) constitute 70%. All examinations conducted in between 2005 and 2009 where electronic examinations for all levels of students, however from 2010 to 2019 electronic ESE were restricted to 100 and 200 level students while the rest were administered Pen on Paper (POP) examinations. These end of semester examinations were usually conducted at the various study centres. In the face of the COVID-19 world pandemic, the university in starting an on-demand virtual examination. The University has in place guidelines for conduct of examinations. Results are issued after Senate ratification of the semester results.

2.8.1. Grading System

Percentage Range	Description	Letter Grade	Point Grade
70.0%and above	Excellent	A	5
60.0% - 69.9%	Very Good	B	4
50.0% - 59.9%	Good	C	3
45.0% - 49.9%	Satisfactory	D	2
40.0% - 44.9%	Pass	E	1
00.0% - 39.9%	Fail	F	0

Source: (NOUN, Senate Guideline on Grading Examinations)

2.8.2. Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

At the end of examinations, they are graded and scored. The raw scores are recorded and are weighted to produce a single point average for each of the courses registered for, and for which students have written the Tutor-Marked Assignments and Examinations.

2.8.3 Formula for Calculation of GPA and CGPA

The Grade Point Average shall be calculated by multiplying the Grade Point (GP) attained in each course by the credit units for the course. The GPA of all the courses are added up and divided by the total number of credit units taken in a semester or session. The **GPA** is computed on semester by semester basis. The formula for calculating the GPA is the following:

$$GPA = \frac{GPE}{TCC}$$

The cumulative grade point average is the Total Grade Point Earned (TGPE) divided by the Total Credits Carried (TCC). The **CGPA** is calculated at the end of two (2) or more semesters. The formula for calculating **CGPA** is the following:

$$TGPE = \frac{CGPA}{TCC}$$

KEY:

TCC - Total Credit Carried
TCE - Total Credit Earned
TGPE - Total Grade Point Earned (Credit Point X Weighted Grade Point)
CGPA - Cumulative Grade Point Average
WGP - Weighted Grade Point

An example of how to calculate the GPA is presented:

Courses	Score %	Grade	Credit Unit	Weighted Grade Point	TGPE
BIO102	67	B	3	4	12
BIO191	75	A	3	5	15
BIO204	46	D	2	2	4
BIO208	54	C	3	3	9
BIO210	73	A	3	5	15
TOTAL			**14**	**19**	**55**

$$\boldsymbol{GPA = \frac{TGPE}{TCC} = \frac{55}{14} = 3.92}$$

2.8.4 Good Academic Standing

In order to be in good standing, you must maintain an average of 1.0 and above. Any student that falls below 1.0 is not in good standing and will be advised to withdraw.

In addition, you must meet all degree award requirements that is, you must pass compulsory courses and electives up to the minimum total

number of credit units required and pass all compulsory GST courses (see section 4.11.3).

2.8.5 End of Programme Clearance

Upon the release of the graduation list, graduating students are required to undergo a clearance process by doing the following:

1. Log into your portal, click on clearance form, which is on the left hand side of the menu;
2. Print out the form, and fill in the necessary information required, e.g. Name, Matric Number, etc. (student data)

Having done the above, you can return to the portal:

1. Click on Study Centre to clear any issues regarding the Centre. If there are none, an official stamp is required here for proof.
2. Click on Library for clearance on books if still having school books in your possession. If there are none, an official stamp is required here for proof.
3. Click on Bursary; here is the final process for clearance on Alumni, project fees, IT, etc. This part will also be stamped by the Faculty representative.
4. Having satisfied all the above, the student is ready for graduation ceremony.

2.9. Maintenance of Academic Atmosphere

The maintenance of academic atmosphere is carried out as follows:

- The department ensures course materials are available in any of the formats (Print, CD, and internet) to all students at the time of request.
- The Head of Department is aware that timetables of facilitation hours and that of the semester examination are made available to students.

- The Head of Department is also aware that, the Centre Directors provide time-log for facilitators who are engaged in facilitating the course materials.
- The Head of Department is aware that classrooms/laboratories used for tutorials are cleaned and suitable for receiving lectures.

The department is focused on bringing the best quality course materials to the students. This would give them the opportunity to practice the profession anywhere. Students are also availed the opportunity of visiting any mass media and the media adjuncts close to their study centres in order to associate themselves with media practices.

The reading and studying of the printed course materials can of course take place in the home, in an environment convenient to the student, or at some designated places called Study Centres. These are places located across the geopolitical zones of the country. At present, there are over 70 study centres across the country.

PART 3 INFORMATION FOR NEW STUDENTS

3.0 Introduction

3.1 Orientation Programme

Student orientation programme is done at their various study centres. The study centre will advise students on the process accordingly.

3.2 Deferment of Admission

This is entertained only based on university policy and conditions.

3.3 Change of Programme and Course

Student process change of courses via their respective study centres. The students download the required form via their study centres and process it through the same study centres.

3.3.1 Registered Students who wish to Change their Programme of Study

Registered students who wish to change their programme of study should process it via their respective study centres. The students download the required form via their Study Centres and process it through the same study centres.

4.0 General Studies Courses (GST): They are university compulsory courses that must be offered and passed before graduation.

4.1 Compulsory General courses for Programmes in the Faculty of Sciences: BIO 101, BIO 191, BIO 102, BIO 192, CHM 101, CHM103, CHM 191, CHM 102, CHM 192, CIT 101, CIT 102, CIT 143, MTH 101, MTH 102, MTH 103, PHY 101, PHY 102, PHY 191,PHY 192, STT 102

5.0 End of Programme Clearance: Students to obtain clearance document from the study centre.

Clearance with:

1. The library
2. Bursary
3. ICT (e- wallet print out)

List of all Staff in the Department

S/N	NAME	SEX	DESIGNATION	E-MAIL	TEL. NO
1	Dr. Maureen Nkemdilim CHUKWU	F	HOD/Senior Lecturer	mchukwu@noun.edu.ng	08033079536
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3	Prof. Monioluwa Omolara OLANIYI	F	Professor	molaniyi@noun.edu.ng	08035362645
4	Prof. Femi PETERS	M	Professor	fpeters@noun.edu.ng	08037033072
5	Prof Chiedu Mafiana	M	Professor	cmafiana@noun.edu.ng	08033444595
6	Prof. Mohammed Bello ABDULLAHI	M	Professor	babdullahi@noun.edu.ng	08060920525
7	Prof. Sani Michael AYODELE	M	Professor	sayodele@noun.edu.ng	08036761286, 08052708131
8	Dr. Emeka OGOKO	M	Associate Professor	eogoko@noun.edu.ng	07067626197
9	Dr. Uduak I. ALETAN	F	Senior Lecturer	ualetan@noun.edu.ng	08070707683

10	Mr. Abiodun Emmanuel ADAMS	M	Lecturer I	aadams@noun.edu.ng	08036381784
12	Dr. Funmilayo Laosebikan AYEDUN	F	Lecturer I	fayedun@noun.edu.ng	08072960424
13	Dr Henrietta KELLE	F	Senior Lecturer	hkelle@noun.edu.ng	08037821945
14	Dr. Akeem. B. Disu	M	Senior Lecturer	adisu@noun.edu.ng	08179639252
	Mr. Effiong IBANGA	M	Lecturer II	eibanga@noun.edu.ng	08167306652
15	Mrs. Kelechi ULEANYA	F	Lecturer II	kuleanya@noun.edu.ng	08063163725
16	Dr. Musa RUNDE	M	Lecturer II	rmusa@noun.edu.ng	07034748665
17	Mrs. Bethel O. EKUTE	F	Lecturer II	bekute@noun.edu.ng	09091360331, 08038509466
18	Miss Adiat ODUNMBAKU	F	Assistant Lecturer	aodunmbaku@noun.edu.ng	08020729200
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22	Juliana Nnewogo Ndubusi	F	Higher Executive Officer	B.Sc. Peace Studies and Conflict Resolution ND in Business Studies	08149050287
23	Aishatu Umaru Maduwa	F	Executive Officer	ND in Business Administration	08065201438
24	Onuche Abdul	M	Asst. Executive Officer	ND in Business Admin and Mgt.	07063935679
25	Iwu Bright E.	M	Asst. Executive Officer	N.C.E Integrated Science	08038568938

Part 4 PROGRAMMES AND DEGREE AWARD REQUIREMENTS

1.0 B.SC. BIOLOGY PROGRAMME

1.1 PROGRAMME CODE: 5213

1.2 LIST OF ACADEMIC STAFF

S/N	NAME	SEX	DESIGNATION	QUALIFICATION	E-MAIL	TEL. NO
1	Prof. Monioluwa Omolara OLANIYI	F	Professor	B.SC. M.SC. PHD	molaniyi@noun.edu.ng	08035362645
2	Prof Chiedu F. Mafiana	M	Professor	B.SC. M.SC. PHD	cmafiana@noun.edu.ng	08033444595
3	Prof. Mohammed Bello ABDULLAHI	M	Professor	B.SC. M.SC. PHD	babdullahi@noun.edu.ng	08060920525

4	Prof. Sani Michael AYODELE	M	Professor	B.SC. M.SC. PHD	sayodele@noun.edu.ng	08036761286 08052708131
5	Dr. Maureen Nkemdilim CHUKWU	F	Senior Lecturer	B.SC. M.SC. PHD	mchukwu@noun.edu.ng	08033079536
6	Dr. Uduak I. ALETAN	F	Senior Lecturer	B.SC. M.SC. PHD	ualetan@noun.edu.ng	08070707683
7	Mr. Abiodun Emmanuel ADAMS	M	Lecturer I	B.SC. M.SC.	aadams@noun.edu.ng;	08036381784

2.0 Introduction

Biology Department is one of the pioneer units in the (defunct) School of Science and Technology that was established as a servicing unit at the inception of the University in 2004. The unit continued in its servicing capacity until the 2011/2012 academic session when the full B.Sc. (Biology) progamme took off.

2.1. Philosophy, Aims and Objectives of the Degree Programme

In its mission to make education available for all, the Open and Distance Learning programmes of National Open University of Nigeria (NOUN) has become a veritable tool of National development.
The main aims and objectives of the degree programme in biology are:

a. To provide students with a broad and balanced foundation of biological knowledge and practical skills

b. To develop in students the ability to apply knowledge and skills to solving theoretical and practical problems in biology

c. To develop in students, a range of transferable skills that are of value in biological and non-biological employment

d. To provide students with knowledge and skills base from which they can proceed to further studies in specialized areas of biology or multi-disciplinary areas involving biology

e. To provide, through training and orientation, an appreciation of the salutary rewards of inter- and multi-disciplinary approach to the solution of complex life problems

f. To generate in students an appreciation of the importance of biochemistry in industrial, economic, environmental, technological and social development

g To instill in students a sense enthusiasm for biological sciences, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying

3.0 Admission Requirements

Application to the B.Sc Biology Programme should meet a minimum of 5 Ordinary Level (O' Level) Credits including English Language, Mathematics, Biology, Chemistry and any one of the following: Geography, Agriculture or Economics with at least, a Pass (D7) in Physics at the National Examination Council (NECO) Level, Senior Secondary School Certificate (SSCE), General Certificate of Education (GCE), West African School Certificate (WASC) of the West African Examination Council (WAEC). Relevant certificates and Diplomas will be considered on individual merits.

3.1 Direct Entry

- OND with upper credit may be admitted into 200 level of the programme.
- NCE with credit passes in any one of the options below may be admitted into 200 level of the programme:
  i. Biology/Chemistry
  ii. Integrated Science/Chemistry
  iii. Related Science based courses
- HND with credit pass in Biology or related programmes, and credit passes in requisite subjects at O' Level may be admitted into 200 Level.
- A level Passes (A-D) in two or more relevant subjects (Biology, Chemistry, Geography, mathematics and Physics)

4.0 Programme Duration

Four years for regular student and 3 years for direct entry students.

4.1.1 Prerequisite Course

The entry requirements into 100 level of the programme shall be at least credit level passes in five subjects including English Language, Mathematics, to form the core course with credit in three other relevant science courses Biology, Chemistry, Technical drawing Agricultural Science and Geography at the Senior Secondary School Certificate or its equivalent and at least a pass in Physics. For the B.Sc. Programme in Biological Sciences, candidates must have credit level passes in Biology, Chemistry and at least a pass in Physics.

For Direct Entry (DE) candidates with two A level passes (graded A-E) at the Advanced Level or its equivalent in one or more relevant subjects (Biology, Botany, Chemistry, Geography, Mathematics and Physics) may undertake the three – year degree programme into 200-level.

Also lower level courses that have relevance to higher ones must be offered and passed first.

4.1.2 Registration procedure

Students to register through their portals.

4.1.3 Opening and closing of the Course Registration portal

As specified by the University Calendar.

4.1.4 Course re-registration

No course re-registration, only exam re-registration. Please, see ICT/MIS for stepwise process

4.1.5 Add and/or Drop courses

Download add and delete form from the student's portal; print, fill and process accordingly through the Centre Director to ICT.

5.0 Eligibility for Graduation

To graduate, a student shall have undergone at least 6-8 semesters of study, depending on entry point, including field practical training. Course work load must meet the graduation requirements of the University based on minimum academic standards. However, in doing so, the student must earn a minimum of 120 credit units for the four year programme and 90 credit units for the three years (Direct entry) programme. The submission of an undergraduate project thesis based on a supervised research is a graduation requirement which cannot be compromised

5.1 Research Projects

At the commencement of 400 Level, students are expected to submit their project topics for approval

5.1.2 Grading, Moderation and Mode of Submission of Projects:

5.1.3 Grading of research projects: Students projects are graded by the assigned supervisors, moderated at the Departments.

5.1.4 Mode of Submission of Projects: Projects and score sheets (hard and soft copies are submitted to the Faculty through the Study Centre.

5.2 Degree Award Requirements: The learner is required to pass all compulsory courses and complete a minimum of 120 and 90 credits for Direct entry students to qualify for an award of the B.Sc. Biology degree

5.3 Compulsory and Elective Courses: Compulsory courses: These are the core courses that must be offered by students and passed at a grade not below E.
Elective Courses: These are optional courses which may be offered based on the interest of the student or for the purpose of

fulfilling the minimum requirement for the award of the degree.

5.4 **Minimum course credits for graduation:** To graduate, a student shall have undergone at least 6-8 semesters of study depending on entry point, including field practical training. Course work load must meet the graduation requirements of the University based on minimum academic standards. However, in doing so, the student must earn a minimum of 120 credit units for the four year programme and 90 credit units for the three years (Direct entry) programme. The submission of an undergraduate project thesis based on a supervised research is a graduation requirement which cannot be compromised.

5.5 **General Studies Courses (GST):** University compulsory courses must be offered and passed before graduation.

BSc. (Hons) Degree in Biology
OUTLINED PROGRAMME PROPOSAL(OPP)

Year I
1st Semester

Course Code	Title	Units	Status
BIO 101	General Biology 1	2	C
BIO 191	General Biology Practical 1	1	C
CHM 101	Introductory Inorganic chemistry	2	C
CHM 103	Introductory Physical Chemistry	2	C
CHM 191	Introductory Chemistry Practical I	1	C
CIT 101	Computers in Society	2	C
GST 101	Use of English and Communication Skills	0	C
GST 107	The Good Study Guide	0	C
MTH 101	Elementary Mathematics I	3	C
PHY 101	Elementary mechanics, Heat & Properties of Matter	3	C
PHY 191	Introductory Physics practical I	1	C
	Total Credit	**17**	

2nd Semester

BIO 192	General Biology Practical 11	1	C
BIO 102	General Biology 11	2	C
GST 102	Use of English and Communication Skills II	0	C
CHM 102	Introductory Organic Chemistry	2	C
CHM 192	Introductory Chemistry Practical II	1	C
PHY 102	Electricity, Magnetism & Modern Physics	3	C
PHY 192	Introductory Physics practical II	1	C
ESM 102	The Nigerian Environment	2	C
MTH 102	Elementary Mathematics II	3	C
CIT 102	Software Application Skills	2	C
	Total Credit	**17**	

YEAR II
1st Semester

BIO 201	Genetics 1	2	C
BIO 203	General Physiology 1	2	C
BIO 205	Introductory Developmental Cell Biology	3	C
BIO 207	Lower Invertebrates	2	C
BIO 209	Chordates	3	C
BIO 211	Coelomate Invertebrates	2	C
BIO 213	Chemistry of Amino Acids and Proteins	2	C
BIO 215	General Biochemistry Laboratory 1	1	C
BIO 217	General Microbiology	3	E
GST 201	Nigerian Peoples and Culture	0	C
GST 203	Introduction to Philosophy & Logic	0	C
	Total Credit (Compulsory)	**17**	
	Total Credit (Elective)	**3**	
	A minimum of one elective to be taken		

2nd Semester

ESM112	Introductory Ecology	2	C
BIO 204	Biological Techniques	2	C
BIO 206	Statistics for Agriculture and Biological Sciences	2	C
BIO 208	Seedless Plants	2	C
BIO 210	Seed Plants	2	C
BIO 212	Helminthology	2	C
BIO 214	Structure and Functions of Major Cell components	2	E
BIO 216	Chemistry of Carbohydrates, Lipids & Nucleic acids	2	C
BIO 218	General Biochemistry Laboratory 11	1	C
BIO 220	Fisheries and Wildlife	2	E
GST 202	Fundamentals of Peace Studies& Conflict Resolutions	2	C
	Total Credit (Compulsory)	**17**	
	Total Credit (Elective)	**4**	
	A minimum of one elective to be taken		

YEAR III

1st Semester

BIO 301	Genetics 11	2	C
BIO 303	General Cytology	2	C
BIO 305	Molecular Biology	2	C
BIO 307	Evolution	2	C
BIO 309	Plant Breeding	1	C
BIO 311	Mycology	2	C
BIO 313	Animal Ecology	2	E
BIO 315	Introductory Nematology	2	C
GST 301	Entrepreneurship Studies I	0	C
	Total credits	**15**	

2nd Semester

BIO 302	Field Course 1	1	C
BIO 304	General Ecology	2	E
BIO 306	General Physiology 11	2	C
BIO 308	Biogeography	2	C
BIO 310	Protozoology	2	C

BIO 312	SIWES	6	C
BIO 314	Animal Behaviour	2	C
BIO 316	Introduction to Bioinformatics	1	C
BIO 318	Immunology and Immunochemistry	3	E
BIO 320	Microbial Ecology	3	E
	Total credit (Compulsory)	**16**	
	Total credit (Elective)	**8**	
	A minimum of one elective to be taken		

BIO 312 SIWES (Choose only 1 from the following areas):

- **Environmental Pollution**
- **Pest Control**
- **Animal and Public Health**
- **Radiation Biology**
- **Biotechnology**

YEAR IV

1st Semester			
BIO 400	Research Project	6	C
BIO 401	Field Course 11	2	C
BIO 403	Population Genetics	2	C
BIO 405	Hydrobiology	2	C
BIO 407	Basic Entomology	2	C
BIO 409	Research Seminar	2	C
BIO 411	Parasitology	2	C
BIO 413	Developmental Biology	2	E
BIO 415	Virology and Tissue Culture	2	E
	Total credit (Compulsory)	**18**	
	Total credit (Elective)	**4**	
	A minimum of one elective to be taken		
2nd Semester			
BIO 402	Cytogenetics of Plants	2	C
BIO 404	Systematic Biology	3	C

BIO 406	Parasitology& Immunology	2	E
BIO 408	Soil Ecology	2	C
BIO 410	Fisheries & Aquaculture	3	C
BIO 412	Wildlife Ecology and Conservation	3	C
BIO 414	Applied Entomology	3	E
BIO 416	Industrial Microbiology	3	E
	Total credit (Compulsory)	**13**	
	Total credit (Elective)	**8**	
	A minimum of one elective to be taken		

DETAILED PROGRAMME PROPOSAL (DPP)

GST101: USE OF ENGLISH AND COMMUNICATION SKILLS 1 (0 UNIT)

Listening enabling skills; Listening and comprehending; comprehension; note-taking and information retrieval, including data, figures, diagrams and charts; listening for main idea, interpretation and critical evaluation. Effective reading: skimming and scanning; Reading and comprehension at various speed levels; Vocabulary development in various academic contexts; Reading diverse texts in narratives and expository; Reading and comprehending passages with tables; Scientific texts; Reading for interpretation and critical evaluation.

GST102: USE OF ENGLISH AND COMMUNICATION SKILLS I1 (0 UNIT)

Writing paragraphs; Topic sentence and coherence; Development of paragraphs; illustration; Description; cause and effect including definitions; Formal letters: essential parts and stylistic forms; complaints and requests; jobs; ordering goods Letters to government and other organizations; Writing reports; reporting events, experiments, writing summaries

GST107: THE GOOD STUDY GUIDE (0 UNIT)

Getting started: How to use the book, why read about skills, getting yourself organised; what is studying all about, reading and note taking; Introduction, reactions to reading, your reading strategy, memory, taking notes, conclusion. Other ways of studying: Introduction, learning in groups, talks and lectures, learning from TV and radio broadcasts, other study media. Working with numbers; Getting to know numbers, describing the world, describing with the tables, describing with diagrams and graphs; What is good writing? The Importance of writing, what does an essay look like, what is a good essay? Conclusion. How to write essays: Introduction, the craft of writing, the advantages of treating essay writing as a craft, making your essay flow, making a convincing case, the experience of writing. Preparing for examination.

BIO 101 GENERAL BIOLOGY I (2 UNITS)

Characteristics of living things; cell as the basic unit of living things, cell structure, organization, cellular organelles, tissues, organs and systems. Classification of living things, general reproduction and concept of inter-relationships of organism. Heredity and evolution. Elements of ecology (introduction) and habitats.

BIO 102 GENERAL BIOLOGY II (2 UNITS)

Systematic studies of diversity of life including monera, protista, plants (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and angiosperms) and animals (Protozoa, Platyhelminthes, Annelids, Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals) based on similarities and differences in external morphology. Taxonomic divisions of plant and animal kingdoms. Ecological adaptations of these forms.

BIO 191 GENERAL BIOLOGY PRACTICAL I (1 UNITS)

What practical work in biology involves. Laboratory organization. Handling common laboratory equipment. Microscopic handling and maintenance. Making microscopic measurements. Procuring animal materials for practicals. Killing, preserving and maintaining animal materials. Procuring plant materials. External features of plants (differences and similarities). Preparation of temporary slides. Preparation of stains and reagents. Techniques for microbial culture and grain staining. Setting up demonstration for physiological processes in plants. Setting up apparatus for demonstrating physiological processes in animals. Preparation required for dissection.

BIO 192 GENERAL BIOLOGY LABORATORY II (1 UNITS)

Observation and description of the morphological and diagnostic features as well as the differences among the different phyla of the plant, animal, archebacteria, eubacteria, fungi and protista kingdoms. Identification of the taxonomic hierarchy of the members of the above groups. Study of the structure and functions of their parts and habitats specifications

CHM 101: INTRODUCTORY INORGANIC CHEMISTRY (2 UNITS)

Hypothesis, theory and law with appropriate illustrations, Nature of matter – 3 states of matter, Atomic structure, electronic energy levels and orbital. Periodic classification of elements and its relationship to their electronic configurations, Chemical bonding, Survey of properties and trends in groups I, II, IV, VI and transition metal,

CHM 102: INTRODUCTORY ORGANIC CHEMISTRY (2 UNITS)

Simple reactions of hydrocarbons, alcohols, and acids. Petroleum chemistry, Oils and fats, hydrogenation of oils, polymer and biologically important molecule.

CHM 103: INTRODUCTORY PHYSICAL CHEMISTRY (2 UNITS)

Mole concepts and calculations based on it, methods of expressing concentrations, Chemical Kinetics and equilibrium, and related calculations, Important application of equilibrium – pH, solubility products and solubility of ionic solids, Thermo chemistry and simple calculations based on Hess's law, Electrochemistry and working of various cells, Brief mentions of corrosion; chemical thermodynamics; $\Delta G = \Delta H - T\Delta S$

CHM 191: INTRODUCTORY PRACTICAL CHEMISTRY I (1 UNIT)

Practical based of CHM 101 and CHM 103: Cations and anions – identification, Acid- base titrations, Redox reactions and determinations

CHM 192: INTRODUCTORY PRACTICAL CHEMISTRY II (1 UNIT)

Practical based on general chemistry CHM 101 and introductory organic chemistry I CHM 102- Determination of melting and boiling points and reaction of functional groups.

CIT 101: COMPUTERS IN SOCIETY (2 UNITS)

What is Computer, Types of Computer, History of Digital Computer, Element of a Computer : Hardware and Software. How to work with a computer. Operating System Windows Files word processing, copying a text, saving, Changes to a document and Formatting, spelling checker and introduction to Printing a document. Spread sheet, Entering and correcting data. Using Formula, Numeric Formats Creating Charts. Types of Charts Power Points and presentation. Networking, Internet and E-mail. Reading and responding to an E-mail message.

CIT 102: SOFTWARE APPLICATION SKILLS (2 UNITS)

Brief description of the computer system: CPU, I/O devices; operating systems; computer file management; Computer software: overview, types, etc.; Application software: common application software; Using Microsoft Word, Using Microsoft Excel, Features of Database applications and Microsoft Access; Statistical analysis applications: Using SPSS software; Introduction to Desktop Publishing applications; Computer applications in the Sciences; Managing the computer system with the control Panel.

ESM 102: THE NIGERIAN ENVIRONMENT (2 UNITS)

General description of the natural, physical features of Nigeria: Vegetation, climate and climatic changes within the geographical expression; Geographical distribution of people and natural recourses. Brief description of economic importance of these features. Exploration and exploitation of natural resources. Brief impact of these on the environment

ESM 112: INTRODUCTORY ECOLOGY (2 UNITS)

General consideration of ecosystems including influence and interaction of human beings with their environments. Similarities, differences of ecosystems. Characteristics and ecological adaptations of various forms life.

MTH 101: ELEMENTARY MATHEMATIC I (3 UNITS)

Elementary set theory, subsets, union, intersection, complements, venn diagrams. Real numbers; integers, rational and irrational numbers, mathematic I, induction real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; algebra of complex numbers; the Argand Diagram. Re Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formalae.

MTH 102: ELEMENTARY MATHEMATICS II (3 UNITS)

Calculus: 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.

PHY 101: GENERAL PHYSICS I (3 UNITS)
(Mechanics, Thermal Physics and Waves)

Space and Time, Units and dimension, Kinematics; Fundamental Laws of Mechanics, statics and dynamics; work and energy; Conservation laws. Elasticity; Hooke's law, Young's shear and bulk moduli, Hydrostatics; Pressure; bouyance, Archimedes' Principles., Surface tension; adhesion, cohesion, capilarity, drops and bubbles. Temperature; heat; gas laws; laws of thermodynamics; kinetic theory of gases. Sound, Applications.

PHY 102: GENERAL PHYSICS: (3 UNITS)
(Electricity, Magnetism and Modern Physics)

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

PHY 191: INTRODUCTORY PRACTICAL PHYSICS I (1 UNIT)

Graphs, Measurement, Error Analysis, Determination of Acceleration due to Gravity by Means of Simple Pendulum, Determination of force constant of a spiral spring, Determination of effective mass of a spiral spring and the constant, Determination of surface tension of water, Determination of specific latent heat of fusion of ice, Determination of the co-efficient of limiting static friction between two surfaces, Determination of the co-efficient of static friction on two surfaces using an inclined plane, Determination of Relative Density of kerosene using the specific Gravity Bottle, Determination of the Relative Density of a Granular substance not soluble in water using the specific gravity bottle.

PHY 192: INTRODUCTORY PRACTICAL PHYSICS II (1 UNIT)

Refraction through the glass block; Image formed by a concave mirror; Determination of the focal length of the convex mirror; Refraction through the triangular prism; Determination of the focal length of a converging lens and the refractive index of groundnut; Determination of resistance of resistors in series and in parallel in simple circuits; Determination of internal resistance of a dry cell using a potentiometer; To compare the E.M.F. of cells using potentiometer; Determine the unknown resistance of a resistor using Wheatstone Bridge; To determine the relationship between current through a Tungsten and a potential applied across it.

GST 201: NIGERIAN PEOPLES AND CULTURE (0 UNIT)

Nigerian history, culture and arts in pre-colonial times; Nigerians' perception of their world; culture areas of Nigeria and their characteristics; evolution of Nigeria as a political unit; indigene/settler phenomenon; concepts of trade; economic self-reliance; social justice; individual and national development; norms and values; negative attitudes and conducts (cultism and related vices); re-orientation of moral and national values; moral obligations of citizens; environmental problems.

GST 203: INTRODUCTION TO PHILOSOPHY AND LOGIC (0 UNIT)

General introduction to logic; clarity of thought, expression and arguments as basis for conclusions; fundamentals of logic and critial thinking; types of discourse; nature of arguments; validity and soundness; techniques for evaluating arguments; distinction between inductive and deductive inferences; etc. Illustrations from familiar texts, including literature materials, novels, law reports and newspaper publications.

BIO 201: GENETICS I (2 UNITS)

Hereditable and non-hereditable characteristics of living organisms, chromosomes, genes, the chromosome theory of inheritance, the chromosome structure of the Eukaryotes and Prokaryotes. Mendel's laws. Genotype, phenotype, dominance, alleles, Linkage, crossing-over, sex-linkage, sex chromosomes and sex determination. Application of genetics in agriculture and medicine.

BIO 203 GENERAL PHYSIOLOGY I (2 UNITS)

Physical and chemical processes in animals and plants; diffusion, osmotic pressure and osmolarity. Water potential, turgor, plasmolysis, Gibbs-Donan relationship. Gas exchange, partial pressures (Tension), Hydrogen-ion concentration (Ph). Henderson Hasselbach equation, buffers in physiology. Nutrition; photo-autotrophism, heterotrophism (essential requirements of each), Respiration and photosynthesis; RQ and QIO in relation to metabolism, photosynthesis, oxygen and carbon dioxide exchange.

BIO 204: BIOLOGICAL TECHNIQUES (2 UNITS)

The course is geared towards introducing students to scientific methods using topics to illustrate ways and means of Biological research. Types of microscopes and their uses. Preparation of microscopic slides. Examination of materials. Dissection guides. Microtomy and hand sectioning. Photometry, Colorimetry. Chromatography. Conductometry. The course will also introduce students to what is research and the techniques of writing scientific reports through developing critical thinking and testing hypotheses, evaluating original research papers and expressing ideas.

BIO 205 INTRODUCTORY DEVELOPMENTAL CELL BIOLOGY (3 UNITS)

History and present trends in cell biology. Reproductive cell division, differentiation and growth of cells. Molecular basis of cell structure and development. Proteins and nucleic acids.

BIO 206 STATISTICS FOR AGRICULTURE AND BIOLOGY (2 UNITS)

Use of statistical methods in Biology and Agriculture. Continuous and discrete variables, Sampling procedure. Sample size. Presentation of statistical results. Frequency distribution. Law of probability, the binomial, Poisson and normal frequency distributions. Estimations and Tests of Hypothesis. Design of simple Agricultural and Biological experiments. Analysis of variance and co-variance, simple regression and corelation, contingency tables, some non-parametric tests. The use of statistical packages such as SPSS and Minitab in statistical analysis.

BIO 207 LOWER INVERTEBRATES (2 UNITS)

Systematic approach to invertebrate morphology and levels of organization. Classification of Protozoa, Rhizopoda, Apicomplexa, Sarcomastigophora, Ciliophora, Parazoa; Porifera. Metazoan; Cnidaria, Platyhelminthes, Nematode, Annelida, Mollusca, Arthropoda, Echinodermata with emphasis on the differences and similarities among the groups; adaptive features to mode of life and their economic importance.

BIO 208 SEEDLESS PLANTS (2 UNITS)

Account of systematics, morphology and reproduction, life histories and ecology of Algae, Fungi, Bryophytes and Pteridopytes, including fossils

BIO 209 CHORDATES (3 UNITS)

Evolution, classification and general characteristics of vertebrate phyla. Evolution and adaptive radiation. Zoogeography.

BIO 210 SEED PLANTS (2 UNITS)

Detailed account of the origin and evolution of seed plants (angiosperms), the mode of reproduction, vascular elements, morphology and anatomy.

BIO 211 COELOMATE INVERTEBRATES (2 UNITS)

Organization and Biology of higher metazoan groups. Anatomy and sexual dimorphism of the metazoans. Economic importance.

BIO 212 HELMINTHOLOGY (2 UNITS)

General classification and characteristics of trematodes, cestodes and nematodes, studies of their morphology and life cycles, epidemiology, pathogenesis and progenetic forms, diagnosis, control methods and economic importance. Practical components should give emphasis on parasite morphology and diagnostic techniques used to identify parasite species.

BIO 213 CHEMISTRY OF AMINO ACIDS AND PROTEINS (2 UNITS)

Structure, properties and classification of amino acids, pH, pka and buffer, peptide. Reactions of specific amino acids, separation of sequence of peptides, chemistry of proteins including their structural level and types of bonds stabilizing them, properties, functions and classifications of proteins, enzymes, vitamins and co-enzymes

BIO 214 STRUCTURE AND FUNCTION OF MAJOR CELL COMPONENTS (2 UNITS)

Prokaryotic versus Eukaryotic cells, elementary treatment of membrane structure (fluid mosaic model) and functions in the eukaryotic cells. Transport across membranes (passive and active), the regulation of the intracellular environment, intracellular organelles, their brief treatment of structure and functions. Preparations of sub-cellular inclusions: chlorophyll, porphyrins and carotenoids

BIO 215 GENERAL BIOCHEMISTRY LABORATORY I (I UNIT)

Introduction to laboratory and laboratory equipment. Safety, housekeeping, washing and drying of glassware in the laboratory. Accuracy of measurement and transfer of liquids and solids. Introduction to photometry and colorimetry. Standard curve in absorption spectra. pH and buffer systems. Qualitative and quantitative tests for amino acids and proteins. Biuret method and estimation of proteins.

BIO 216 CHEMISTRY OF CARBOHYDRATES, LIPIDS AND NUCLEIC ACIDS (2 UNITS)

Classification of physical properties of carbohydrates, structure of glucose, projection and perspective formular, structure of properties of other monossacharides, brief treatment of dissacharides and polyssacharides. Chemistry, classification and properties of lipids. Methods of analysis of lipids, lipoprotein, membrane and membrane structure. Chemistry of nucleic acids (Bases, Sugar and Phosphate acid). Structure and roles of RNA and DNA

BIO 217 GENERAL MICROBIOLOGY (3 UNITS)

Historical aspects, scope of microbiology, general characteristics of microorganisms, growth and reproduction of microorganisms; sterilization and disinfection; brief survey of microbes as friends and foes. Systematic classification of bacteria fungi, viruses, etc. Microbial variation and heredity; biological and biochemical reactions of microorganisms; cycles of elements in nature; Nitrogen fixation.

BIO 218 GENERAL BIOCHEMISTRY LABORATORY II (I UNIT)

General texts in concentration, Reaction of carbohydrate, thin layer of chromatographic separation of sugar. Estimation of glucose in biological fluid (blood and urine). Analysis of lipids for double bond and free fatty acids. Separation by thin layer chromatography. Separation and purification of nucleic acids. Estimation of DNA and RNA. Estimation of phosphate and titratable acidity.

GST301: ENTREPRENEURIAL STUDIES I (0 UNIT)

Introduction to entrepreneurship and new venture creation; Entrepreneurship in theory and practice; The opportunity, Forms of business, Staffing, Marketing and the new venture; Determining capital requirements, Raising capital; Financial planning and management; Starting a new business, Feasibility studies; Innovation; Legal Issues; Insurance and environmental considerations. Possible business opportunities in Nigeria. knails, screws making Dyeing/Textile blocks paste making.

BIO 301 GENETICS II (2 UNITS)

Selected topics from population genetics, cytogenetics, microbial genetics, animal and plant genetics. Biochemical and biomedical genetics, human genetics. Further consideration of various deviations from basic principles, pedigree analysis, gene interactions.

BIO 302 FIELD COURSE I ((1 UNIT)

Biological sampling techniques in local habitats. Students may visit and inspect laboratories, research institutes and industrial plants concerned with medical, biotechnological processes and related fields. A written report must be submitted to the Department for assessment.

BIO 303 GENERAL CYTOLOGY (2 UNITS)

Light, phase-contrast, Dark-field and Electron Microscopy, Autoradiography, Florescence. Cell cycles. Introductory cytogenetics. History and present trends in cell biology. Reproduction and cell division, cell differentiation and growth of cells. Molecular basis of cell structure and developmental cell biology. Proteins and Nucleic acids.

BIO 304 GENERAL ECOLOGY (2 UNITS)

The ecosystem approach to the study of ecology. Types of interaction. Energy flow and nutrient cycling, population structure, population dynamics: birth and death rate, life tables and longevity. Communities in ecosystem. Influence of man.

BIO 305 MOLECULAR BIOLOGY (2 UNITS)

Genetics studies of microorganism, metabolic pathways, genes and chromosomes, nucleic acids (RNA and DNA), replication, transcription, gene expression and sequencing, protein synthesis, genotype, genetic code,

BIO 306 GENERAL PHYSIOLOGY II (2 UNITS)

A general study of osmo-regulation, excretion, transport, homeostasis, and their coordination in animals. Plant-water relationships, growth regulation. Physiological aspects of crop yield

BIO 307 EVOLUTION (2 UNITS)

Theories of evolution, Population genetics, gene frequency/equilibrium. Hardey Weinberg Principle, Polymorphism. Variation; types and causes, reshuffling of genes, Mutation; origin and types. Polyploidy, isolation mechanism, adaptation; origin of life; evolution of organic molecules, Polymer synthesis; isolation and replication, the first cell, origin of species. Evidence of evolution; fossils (carbon dating), comparative anatomy, Taxonomy, Comparative-biochemistry, physiology, immunology, cell biology. Evolution of the plants, role of oxygen, multicellular development. Phylogeny, geological periods and epochs.

BIO 308 BIOGEOGRAPHY (2 UNITS)

Distribution of world flora, floristic regions of the world and zoogeographic regions of the world, comparision of tropical and temperate flora, dispersal and colonization of land by plants and animals, island biogeography, relationships between vegetation, soil types and climate, relationships between plant distribution and world fauna

BIO 309 PLANT BREEDING (1 UNIT)

Importance of plant breeding, cytological principles of breeding, heterosis, inbreeding consequences, incompatibility mechanisms, sterility, breeding methods, disease and pest resistance and their inheritance, major farm and domestic plants and the breeding practices used to sustain desired qualities.

BIO 310 PROTOZOOLOGY (2 UNITS)

Classification and evolutionary relationships of the protozoa. Macro and Micro structure of protozoa. The role of protozoa in ecosystems. The ecology of protozoa, their physiology and biochemistry. Life histories of protozoa of medical and veterinary importance, with emphasis on tropical species; the pathology, epidemiology and control of protozoan infections.

BIO 311 MYCOLOGY (2 UNITS)

Classification, structure, life cycles and physiology of fungi, their economic importance.

BIO 312 SIWES (6 UNITS)

This is a compulsory course designed to train the students on the Industrial application of Biological knowledge. The course will be undertaken within the country at laboratories, research institutes and industrial plants concerned with biological, medical, biotechnological processes and related fields. Each student will be supervised at least once while on attachment by a designated staff of the school.

BIO 313 ANIMAL ECOLOGY (2 UNITS)

The ecology of local terrestrial and aquatic animals; growth rate and age structure of animal populations; natality and mortality, survivorship curves. Life tables and K-factor analysis. Competition. The natural regulation of animal numbers. Population cycles. The dynamics of predator-prey systems. The ecology of African mammals. Behavioural ecology.

BIO 314 ANIMAL BEHAVIOUR (2 UNITS)

History of ethology. Reflex and complex behaviour. Orientation and taxes. Fixed action patterns, releasers, motivation and driver. Displays, displacement activities and conflict behaviour. Learning communication and social behaviour. The social behaviour of primates. Hierarchical organization. The physiology of behaviour.

Habitat selection, homing and navigation. Courtship and parenthood. Biological clocks.

BIO 315 INTRODUCTORY NEMATOLOGY (2 units)

Principal characteristics of nematodes, morphology, position and outlines of classification of nematodes. Morphology and biology of important plant parasitic nematodes and their economic importance. Nematological techniques. General principles and methods of controlling nematodes.

BIO 316 INTRODUCTION TO BIOINFORMATICS (1 UNIT)

Definitions, Database Hierarchies, Sequence Databses, Tools & databases, BLAST, Nucleotide and Amino acids Alignments, Sequence Analysis, Gene mining, Phylogenetic analysis, Gene Annotation, Data Analysis

BIO 318 IMMUNOLOGY AND IMMUNOCHEMISTRY (3 UNITS)

Basic concepts ofimmunology, structure of antigenic determinants cellular response, genetics of response to antigenic stimulation. Structure and classification of immunolglobulins and antibodies. Mechanisms of antibody formation. Antigen-antibody interactions; role of lymphoid tissues and thymus in immuno-responses. Hypersensitivity, immunopathology, auto-pathology, auto immunology, tumor and transplantation immunology, immunoprophylaxis modern techniques in immunology and immunochemistry. Principles of Chemothorapy. History of chemotherapy. Basic pharmaco dynamics and pharmacokinetics.

Chemotherapeutic agents: antibacterial, antifungal, antiviral antiprotozoan and anti helminths. Modes of action of antimicrobials. Chemotherapy of specific diseases. Drug bio-assays and sensitivity tests

BIO 320 MICROBIAL ECOLOGY (3 UNITS)

Microbes and Ecological Theory. Physiological, morphological and genetic adaptations of microorganisms to their environment. Microbial interactions. Microorganisms in ecosystems. Microbial bio-conversions

BIO 400 RESEARCH PROJECT (6 UNITS)

Each student, in consultation with a Departmental academic staff, will select a specific problem in biology discipline to be his/her project and will write a research proposal at the beginning of the first semester of level 400. The student will learn how to design, carry out, and evaluate the results of a research project in the university laboratory and/or in the field and at the end, to write and present a seminar on the results of his research project to graduates and staff of the Department.

BIO 401 FIELD COURSE II (2 UNITS)

To undertake field trips in fulfillment of certain courses such as entomology, hydrobiology, ecology, helminthology, parasitology e.t.c. Students may visit and inspect laboratories, research institutes and industrial plants concerned with medical, biotechnological processes and related fields.

BIO 402 CYTOGENETICS OF PLANTS (2 UNITS)

Aspects of cell and nuclear divisions, morphology and behaviour of chromosomes, chromosomal aberrations and polyploidy.

BIO 403 POPULATION GENETICS (2 UNITS)

Population concept of evolution: genetic equilibrium. Natural selection, analysis of gene frequencies, genetic variation in population, divergent speciation, isolating mechanism, migration and genetic drift, adaptive drift, adaptation and survival.

BIO 404 SYSTEMATIC BIOLOGY (3 UNITS)

Principles and methods in biosystematics. Concept of Taxonomic characters. Morphological anatomical, palynological, embryological, cytological and physiochemical characters. Principles used in the delination of taxa and attribution of rank. Numerical taxonomy. Concepts of specific and intraspecific categories. Morphological study of selected plant families to illustrate evolutionary tendencies and phylogenetic relationships

BIO 405 HYDROBIOLOGY (2 UNITS)

Physical and chemical aspects of freshwater environments, spatial and temporal pattern of light, temperature and Oxygen. Fresh water flora and fauna with particular reference to West Africa. Plankton, benthic invertebrates, fish and plant communities, production and energy flow. Characteristics of African freshwater. Case studies of various African fresh water habitats: a tropical swamp (Lake Chilwa), a warm spring

(Wikki spring), an ancient lake (Lake Tanganyika), a new man-made lake (Lake Kainji and Tiga Lake). Problems associated with tropical freshwater, eutrophication, pollution and water-linked diseases. The practical component of the course should include basic techniques for isolation and characterisation of environmental soil and water microfauna, including methods for enumeration and measurement of physiological activity.

BIO 406 PARASITOLOGY AND IMMUNOLOGY (2 UNITS)

Nature of immunity. Innate immunity (non specific defence mechanisms). Antigen. Acquired immunity. Hypersensitivity. Immunology of tissue transplantation. Infection, immunity and protection. Autoimmunity. Interaction of antibody with antigens.

BIO 407 BASIC ENTOMOLOGY (2 UNITS)

Insect evolution, classification and distribution. Organization of external structure. Ingestion, digestion, excretion, blood circulation and nervous system. Behavior and ecology of social insects.

BIO 408 SOIL ECOLOGY (2 UNITS)

Classification and characterization of soils. Chemical components and analysis of soils and plant tissue. Plant, soil and water relationships. Physical and chemical properties of soil. Detritus organisms. Cycling of mineral and nutrient pool.

BIO 409 RESEARCH SEMINAR (2 UNITS)

This is usually a scholarly research paper that students write on a specific topic chosen in the field of Biological Sciences under the supervision of a designated academic staff. The topic will be researched, written in a typical scientific format and presented before academic staff in the Department for assessment.

BIO 410 FISHERIES AND AQUACULTURE (3 UNITS)

The gross external morphology of bony and cartilaginous fishes; Basic functions of piscine organs and major systems in fish; food and feeding habits of fishes; Age and growth determination, fecundity; fish culture techniques e.g. Monoculture, Polyculture, pond construction and management, hatchery, management; fish feed formulation; induced breading and hybrization techniques. Major fish processing techniques

BIO 411 PARASITOLOGY (2 UNITS)

Principles of Parasitological and Zoo-economic effects. Introduction to parasitism history and evolution of parasitism, types of parasitism, host-parasite relationships. Parasitic protozoa, trematodes, cestodes, nematodes, acanthocephalans, leeches and arthropods.

BIO 412 WILDLIFE ECOLOGY AND CONSERVATION (3 UNITS) General principles of ecosystem management, wildlife disease, principles of wildlife management. Wildlife in Nigeria; conservation policies, problems and prospects. World wildlife resources and their protection

BIO 413 DEVELOPMENTAL BIOLOGY (2 UNITS) Gametogenesis, fertilization, morulla formation, invagination, organogenesis, and general embryology.

BIO 414 APPLIED ENTOMOLOGY (3 UNITS) Introduction to the systematics and biology of the major economically important insets and mites, their roles as pests and parasites. Chemical pest control methods, their formulations, metabolisms, behaviour in the environment problems of resistance, intergrated pest management. Alternative control strategies (insect-plant co-evolution, plant resistance and insect numbers, insect-insect relationships, manipulating insect behaviour, semio-chemicals, sterile-insect-technique. Pest forecasting.

BIO 415 VIROLOGY AND TISSUE CULTURE (2 UNITS) Viruses pathogenic to man and animals with emphasis on virulence types of diseases caused methods of control. Experiments with bacteriophages and representative animal viruses to demonstrate characteristics of viruses and viral virulence. Methods of viral cultivation and identification, with special reference to tissue culture techniques

BIO 416 INDUSTRIAL MICROBIOLOGY (3 UNITS)

Nature of Industrial Microbiology. Microorganisms of industrial importance. Aspects of the biology of molds, yeasts, Actinomycetes and viruses of importance in various fermentations. Culture techniques and maintenance of selected cultures. Mutation, strain selection and development, hybridisation, media formulation and economics. Optimization of fermentation media at laboratory scale. Perimeter design operation. Antifoams. Aspects of biochemical engineering. Patents and patent

B.Sc. CHEMISTRY PROGRAMME
Programme Code: 5212

LIST OF ACADEMIC STAFF

S/N	Name of Staff	Rank/Designation	Qualification and Degree Status
1	Prof Femi Peters	Professor	BSc, MSc, Ph.D Polymer Chemistry
2	Dr. Emeka Ogoko	Associate Professor	BSc Chem., MSc Analytical Chem., Ph.D Analytical Chem.
3	Dr. Uduak I. ALETAN	Senior Lecturer	B.Sc. Biochemistry, M.Sc. Biochemistry, Ph.D Biochemistry
4	Dr. Henrietta I. Kelle	Senior Lecturer	BSc Industrial Chem., MSc Pure & Industrial Chem., Ph.D Environmental Chem.
5	Dr. Musa RUNDE	Lecturer I	B.Sc. Biochemistry, M.Sc. Petroleum Chemistry, Ph.D Organic Chemistry
6	Mrs. Kelechi Uleanya	Lecturer II	BSc Chemistry, MSc Pure and Industrial Chemistry
7	Mrs Bethel Ekute	Lecturer II	BSc Chemistry, MSc Industrial Chemistry
8	Miss Adiat Odunmbaku	Assistant Lecturer	BSc Chemistry, M.Sc. Analytical Chemistry.
9	Mrs. Folasade Aderanti	Assistant Lecturer	BSc Biochemistry, MSc Biochemistry

CURRICULUM FOR THE B.SC CHEMISTRY PROGRAMME

1.0 Programme Profile: BSc. Chemistry

1.1 Programme Code: 5212

2.0 Philosophy, Aims and Objectives of the Programme

2.1 Introduction

The Chemistry Unit shall implement the missions of the Faculty of Sciences and the National Open University of Nigeria (NOUN), by providing world-class instruction (in an open-distance learning environment, ODL) and research in the chemical sciences. These efforts shall encompass chemistry and industrial chemistry, but shall become interdisciplinary in future. The Unit shall support and inform instruction and research in allied areas such as the biological sciences, physics & material sciences, agriculture, environmental sciences, and public policy. Already, the Unit provides constituent courses to Science Education, Environmental Sciences, Agriculture and Mathematical Sciences.

At present, the Unit offers only one programme - The B.Sc (Hons) Chemistry programme. This programme is intended for students who are primarily interested in careers as professional Chemists or wish a thorough grounding in chemistry in preparation for professional or graduate school in chemistry and other disciplines.

2.2 Philosophy

The Unit shall support and inform instruction and research in allied areas of physical, biological and environmental science. An important part of the philosophy of our approach is that the chemistry students have broad background in mathematics and physics, while still undergraduates. The Unit is dedicated to teaching chemistry in a mode in which physical distance from the University is an insignificant constraint in the access of instructional materials (ODL); the advent of the internet gives credence to this mode of instruction delivery. The Unit is also committed to contributing to the advancement of scientific discovery in the areas of energy, sustainability and the preservation of the natural environment.

2.3 Objectives

- To stimulate in the students sustained interest and enthusiasm in chemistry and applications
- To build in students a culture of continuing enquiry
- To provide students with a broad and balanced base of chemical knowledge and practical skills
- To develop in students a range of skills applied in chemical and non-chemical areas, that can provide confidence for employment
- To develop the students' capacity to readily adapt to and make use of emerging technologies in an open-distance learning environment.
- To provide easily accessible, flexible and lifelong learning in Chemistry for all willing Nigerians
- To promote appreciation of professional responsibility
- To promote a basic knowledge of the concepts of mathematics and science, particularly chemistry and the ability to apply this knowledge in the design, implementation, and analysis of experiments

- To produce self-reliant graduates for self-employment in applied chemistry.
- To prepare the students for jobs in the growing chemical and allied manufacturing industries in the country.
- To provide students with a solid base of chemical knowledge and skills that are required for postgraduate studies and research
- To Inculcate in students an appreciation of chemistry in all human endeavours

3.0 Admission and Graduation Requirements

3.1 Admission requirements

1. 4 –year B.Sc.(Hons) Chemistry
   - The entry requirements shall be at least credit level passes in five subjects including English Language, Mathematics, Chemistry to form the core course with credit in Physics, and any other relevant science subjects at the Senior Secondary School Certificate or its equivalent. In addition, an acceptable pass in the University.
   - O'level credit passes in five subjects, which must include **Mathematics**, **English language**, **Chemistry** and **Physics**; and obtained in not more than 2 sittings.
     *'O' level results are the ones conducted by: West African Examination Council (WAEC), GCE London-moderated 'O' level, and University of Cambridge-moderated 'O' level.

2. 3 –year B.Sc(Hons) Chemistry (Direct entry)
   (i) O'level credit passes in five subjects, which must include **Mathematics**, **English language**, **Chemistry** and **Physics**; and obtained in not more than 2 sittings.

(ii) In addition, candidates must possess at least an upper credit in OND or NCE in Chemistry or a closely related course.

(iii) Candidates with two A level passes (graded A-E) at the Advanced Level in one or more relevant subjects (Biology, Botany, Chemistry, Geography, Mathematics and Physics)

3.2 Graduation requirements

To graduate, a student shall have undergone at least 6-8 semesters of study depending on entry point, including field practical training. Students are to pass a minimum of 128 credit units for a 4-year B.Sc (Chemistry) programme; and 98 units for a 3-year B.Sc (Chemistry) programme, excluding the GST courses. The submission of an undergraduate project thesis based on a supervised research is a graduation requirement which cannot be compromised.

4.0 Learning Outcomes

All Bachelors honours degree student in Chemistry are expected to develop the following abilities and skills:

a. *Regime of Subject Knowledge*
Cognitive abilities and skills relating to solution of problems in Chemistry and other allied chemical industries.

b. *Competencies and Skills*
Practical skills relating to the conduct of Laboratory work in Chemical Industries.

c. *Behavioral Attitudes*
General skills relating to non-subject specific competencies, communication, interpersonal, organization

5.0 Attainment Levels

Graduates of Chemistry are expected to have the ability to apply knowledge and skills to solving theoretical and practical problems in Chemistry and other allied industries in relation to national and societal needs.

5.1 The Curriculum

- See OPP and DPP

5. 2 Pedagogy/Learning Resources

In an ODL environment, the student should always be at the centre of every activity; hence the instruction delivery is not as in our usual academic and administrative practices. Face-to-face interaction terminates at the facilitation level (at the respective study centres). However, the best possible mix of media shall be used to support the teaching-learning process; these include:

- Print media
- Web-based courseware
- Online interaction (Online Facilitation)

OUTLINED PROGRAMME PROPOSAL (OPP)
B.Sc. Chemistry

Outline Programme Proposal (OPP)
B.Sc. Chemistry

Year I

First Semester

Code	Course Title	Status	Units
GST101	Use of English and Communication Skills I	C	2
GST107	The Good Study Guide	C	2
BIO 101	General Biology I	C	2
BIO 191	General Biology Practical 1	C	1
CHM 101	Introductory Inorganic Chemistry	C	2
CHM 103	Introductory Physical Chemistry	C	2
CHM 191	Introductory Practical Chemistry I	C	1
MTH 101	Elementary Mathematics I	C	3
PHY101	Elementary Mechanics, Heat and Properties of Matter	C	2
PHY191	Introductory Practical Physics I	C	1
	TOTAL		**20**

Second Semester

Code	Course Title	Status	Units

GST104	Use of Library	C	2
BIO 102	General Biology II	C	2
BIO 192	General Biology Laboratory II	C	1
CHM102	Introductory Organic Chemistry	C	2
CHM192	Introductory Practical Chem. II	C	1
CIT 104	Introduction to Computer	C	2
MTH102	Elementary Mathematics II	C	2
PHY 102	Electricity, Magnetism and Modern Physics	C	3
PHY 192	Introductory Practical Physics II	C	1
STT102	Introductory Statistics	C	2
	TOTAL		**18**

Year II

First Semester

Code	**Course Title**	**Status**	**Units**
GST201	Nigerian Peoples and Cultures	C	2
GST203	Introduction to Philosophy and logic	C	2
CHM201	Physical Chemistry II	C	2
CHM203	Organic Chemistry II	C	2

CHM205	Inorganic Chemistry II	C	2
CHM291	Practical Chemistry III- Inorganic	C	1
MTH281	Mathematical Methods I	C	2
Students are to choose at least ONE of the elective courses below			
BIO 213	Chemistry of Amino Acids and Proteins	E	2
BIO 203	General Physiology 1	E	2
	TOTAL		**15**

Second Semester

Code	**Course Title**	**Status**	**Units**
GST202	Fundamentals of Peace Studies & Conflict Resolutions	C	2
CHM202	Analytical Chemistry I	C	2
CHM204	Structure and Bonding	C	2
CHM292	Practical Chemistry IV - Physical and Organic	C	1
MTH212	Linear Algebra II	C	2
PHY202	Modern Physics I	C	2
PHY204	Electromagnetism	C	2
Students are to choose at least ONE of the elective courses below			
BIO 216	Chemistry of Carbohydrates and , Lipids & Nucleic acids	E	2

ESM112	Introductory Ecology	E	2
	TOTAL		**15**

Year III

First Semester

Code	**Course Title**	**Status**	**Units**
GST302	Business Creation and Growth	C	2
CHM301	Physical Chemistry III	C	3
CHM303	Inorganic Chemistry III	C	3
CHM305	Organic Chemistry III	C	3
CHM307	Atomic & Molecular Structure & Symmetry	C	3
CHM309	Organic Spectroscopy	C	2
CHM391	Practical Chemistry V Inorganic & Analytical	C	1
Students are to choose at least ONE of the courses below			
CHM311	Petroleum Chemistry	E	2
CHM315	Carbohydrate Chemistry	E	2
	TOTAL		**19**

Second Semester

Code	**Course Title**	**Status**	**Units**
CHM302	Polymer Chemistry I	C	2

CHM306	Instrumental Methods of Analysis	C	2
CHM312	Industrial Chemical Processes I	C	2
CHM314	Environmental Chemistry	C	2
CHM318	Natural Product Chemistry I	C	2
CHM394	Industrial Training (SIWES)	C	6
Students are to choose at least One of the courses below			
CHM304	Colour Chemistry and Technology	E	2
CHM316	Industrial Chemical Technology I	E	2
	TOTAL		**18**

Year IV

First Semester

Code	**Course Title**	**Status**	**Units**
CHM 407	Reaction Kinetics	C	3
CHM 409	Electrochemistry	C	2
CHM 411	Project	C	6
CHM 413	Analytical Chemistry II	C	2
CHM 421	Heterocyclic Chemistry	C	2
CHM 423	Coordination Chemistry	C	3
	Students are to choose at least one of the courses below		
CHM 405	Chemical Thermodynamics	E	2

CHM417	Industrial chemical processes II	E	2
CHM415	Industrial Chemical Technology II	E	2
	TOTAL		**20**

Second Semester

Code	**Course Title**	**Status**	**Units**
CHM 400	Seminar	C	1
CHM406	Nuclear and Radiochemistry	C	2
CHM408	Polymer Chemistry II	C	2
CHM 414	Photochemistry and Pericyclic Reactions	C	2
CHM416	Organic Synthesis	C	2
	Students are to choose at least TWO of the courses below		
CHM422	Natural Products Chemistry II	E	2
CHM426	Chemistry of Lanthanides & Actinides	E	2
CHM402	Theory of molecular spectroscopy	E	2
CHM424	Non Aqueous Solvents	E	2
	TOTAL		**13**

SUMMARY OF COURSE STATUS

S/N	LEVEL	**STATUS** **COMPULSORY COURSES (CREDIT UNIT**	**STATUS** **ELECTIVE COURSES (CREDIT UNIT)**	**TOTAL CREDIT UNIT**
1	100	38	0	38
2	200	26	4	30
3	300	33	4	37
4	400	27	6	33
TOTAL		**124**	**14**	**138**

Detailed Programme Proposal (DPP)

BSc. Chemistry

100 LEVEL

GST101: USE OF ENGLISH AND COMMUNICATION SKILLS 1 (2 UNITS)

Listening enabling skills; Listening and comprehending; comprehension; note-taking and information retrieval, including data, figures, diagrams and charts; listening for main idea, interpretation and critical evaluation. Effective reading: skimming and scanning; Reading and comprehension at various speed levels; Vocabulary development in various academic contexts; Reading diverse texts in narratives and expository; Reading and comprehending passages with tables; Scientific texts; Reading for interpretation and critical evaluation.

GST107: THE GOOD STUDY GUIDE (2 UNITS)

Getting started: How to use the book, why read about skills, getting yourself organised ; what is studying all about, reading and note taking; Introduction, reactions to reading, your reading strategy, memory, taking notes, conclusion. Other ways of studying: Introduction, learning in groups, talks and lectures, learning from TV and radio broadcasts, other study media. Working with numbers; Getting to know numbers, describing the world, describing with the tables, describing with diagrams and graphs; What is good writing? The Importance of writing, what does an essay look like, what is a good essay? Conclusion. How to write essays: Introduction, the craft of

writing, the advantages of treating essay writing as a craft, making your essay flow, making a convincing case, the experience of writing. Preparing for examination.

CHM 101: INTRODUCTORY INORGANIC CHEMISTRY (2 UNITS)

Hypothesis, theory and law with appropriate illustrations, Nature of matter – 3 states of matter, Atomic structure, electronic energy levels and orbital. Periodic classification of elements and its relationship to their electronic configurations, Chemical bonding, Survey of properties and trends in groups I, II, IV, VI and transition metal,

CHM 102: INTRODUCTORY ORGANIC CHEMISTRY (2 UNITS)

Simple reactions of hydrocarbons, alcohols, and acids. Petroleum chemistry, Oils and fats, hydrogenation of oils, polymer and biologically important molecule.

CHM 103: INTRODUCTORY PHYSICAL CHEMISTRY (2 UNITS)

Mole concepts and calculations based on it, methods of expressing concentrations, Chemical Kinetics and equilibrium, and related calculations, Important application of equilibrium – pH, solubility products and solubility of ionic solids, Thermochemistry and simple calculations based on Hess's law, Electrochemistry and working of various cells, Brief mentions of corrosion; chemical thermodynamics; $\Delta G = \Delta H - T\Delta S$

CHM 191: INTRODUCTORY PRACTICAL CHEMISTRY I (1 UNIT)

Practical based of CHM 101 and CHM 103: Cations and anions – identification, Acid- base titrations, Redox reactions and determinations

CHM 192: INTRODUCTORY PRACTICAL CHEMISTRY II (1 UNIT)

Practical based on general chemistry CHM 101 and introductory organic chemistry I CHM 102- Determination of melting and boiling points and reaction of functional groups.

BIO 101: GENERAL BIOLOGY I (2 UNITS)

Characteristics of living things; cell as the basic unit of living things, cell structure, organization, cellular organelles, tissues, organs and systems. Classification of living things, general reproduction and concept of inter-relationships of organism. Heredity and evolution. Elements of ecology (introduction) and habitats.

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BIO 102 GENERAL BIOLOGY II (2 UNITS)

Systematic studies of diversity of life including monera, protista, plants (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and angiosperms) and animals (Protozoa, Platyhelminthes, Annelids, Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals) based on similarities and differences in external morphology. Taxonomic divisions of plant and animal kingdoms. Ecological adaptations of these forms.

BIO 191 GENERAL BIOLOGY PRACTICAL I (1 UNIT) What practical work in biology involves. Laboratory organization. Handling common laboratory equipment. Microscopic handling and maintenance. Making microscopic measurements. Procuring animal materials for practicals. Killing, preserving and maintaining animal materials. Procuring plant materials. External features of plants (differences and similarities). Preparation of temporary slides. Preparation of stains and reagents. Techniques for microbial culture and grain staining. Setting up demonstration for physiological processes in plants. Setting up apparatus for demonstrating physiological processes in animals. Preparation required for dissection.

BIO 192 GENERAL BIOLOGY LABORATORY II (1 UNIT) Observation and description of the morphological and diagnostic features as well as the differences among the different phyla of the plant, animal, archebacteria, eubacteria, fungi and protista kingdoms. Identification of the taxonomic hierarchy of the members of the above groups. Study of the structure and functions of their parts and habitats specifications.

CIT 101: COMPUTERS IN SOCIETY (2 UNITS)

What is Computer, Types of Computer, History of Digital Computer, Element of a Computer : Hardware and Software. How to work with a computer. Operating System Windows Files word processing, copying a text, saving, Changes to a document and Formatting, spelling checker and introduction to Printing a document. Spread sheet, Entering and correcting data. Using Formula, Numeric Formats Creating Charts. Types of Charts Power Points

and presentation. Networking, Internet and E-mail. Reading and responding to an E-mail message.

MTH 101 ELEMENTARY MATHEMATIC I: (3 UNITS)

(ALGEBRA AND TRIGONOMETRY)

Elementary set theory, subsets, union, intersection, complements, venn diagrams. Real numbers; integers, rational and irrational numbers, mathematic I, induction real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; algebra of complex numbers; the Argand Diagram. Re Moivre's theorem, nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formalae.

MTH 102: ELEMENTARY MATHEMATICS II: (2 UNITS)

Calculus: 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

STT 102: INTRODUCTORY STATISTICS (2 UNITS)

Measures of Central Tendency and dispersion, (grouped and ungrouped); mean: - arithmetic and geometric, harmonic, median, mode quartiles, deciles, modes, relative and absolute dispersion, sample 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 Poisson and Normal distributions. Normal approximation to binomial and Poisson distribution, Hyper geometric.

PHY 101: ELEMENTARY MECHANICS, HEAT AND PROPERTIES OF MATTER (2 UNITS)

Space and Time: Physical quantities: Units and dimensions of physical quantities; Kinematics: Uniform velocity motion, uniformly accelerated motion; Dynamics: Newton's laws of motion; Impulse and Linear Momentum, Linear Collision, Newton's universal law of gravitation; Work, energy and power; Conservation laws; Concept of mechanical equilibrium;

Centre of mass and centre of gravity; Moment of a force; Rotational kinematics and dynamics: Torque; Moment of Inertia; angular momentum; Total mechanical energy. Simple harmonic motion

Heat and temperature, work and heat, Quantity of heat: heat capacities, latent heat; Thermal expansion of solids, liquids and gases; Gas laws, heat transfer; Laws of thermodynamics: Isothermal and Adiabatic changes, Carnot cycle; Application kinetic theory of gases; van der Waals gas.

Classification of matter into (solids, liquids and gases, forces between atoms and molecules, molecular theory of matter, Elasticity, plasticity, Hook's Law, Young's Shear and bulk Moduli) Crystalline and non-crystalline materials, Hydrostatics: pressure, buoyancy, Archimedes' principle; Hydro-dynamics-streamlines, Bernouli and Continuity equations, turbulence, Reynold's number, Viscosity, laminar flow, Poiseuille's equation; Surface tension, adhesion, cohesion, capillary, drops and bubbles.

PHY 102: ELECTRICITY, MAGNETISM AND MODERN PHYSICS (3 UNITS)

Electrostatics: Coulomb's law, Gauss's law, potential and capacitance, dielectrics, production and measurement of static electricity. Current: Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters; D.C. circuits: sources of emf and currents, Kirchhoff's laws; Electrochemistry; The Earth's magnetic field; Magnetic fields and induction, Faraday's and Lenz's laws; Force on a current-carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators. A.C. Theory. Atomic structure; Production and properties of X-rays; Radioactivity; Photoelectric emission.

PHY 191: INTRODUCTORY PRACTICAL PHYSICS I (1 UNIT)

Graphs, Measurement, Error Analysis, Determination of Acceleration due to Gravity by Means of Simple Pendulum, Determination of force constant of a spiral spring, Determination of effective mass of a spiral spring and the constant, Determination of surface tension of water, Determination of specific latent heat of fusion of ice, Determination of the co-efficient of limiting static friction between two surfaces, Determination of the co-efficient of static friction on two surfaces using an inclined plane, Determination of Relative Density of kerosene using the specific Gravity Bottle, Determination of the Relative Density of a Granular substance not soluble in water using the specific gravity bottle.

PHY 192: INTRODUCTORY PRACTICAL PHYSICS II (1 UNIT)

Refraction through the glass block; Image formed by a concave mirror; Determination of the focal length of the convex mirror; Refraction through the triangular prism; Determination of the focal length of a converging lens and the refractive index of groundnut; Determination of resistance of resistors in series and in parallel in simple circuits; Determination of internal resistance of a dry cell using a potentiometer; To compare the E.M.F. of cells using potentiometer; Determine the unknown resistance of a resistor using Wheatstone Bridge; To determine the relationship between current through a Tungsten and a potential applied across it.

200 LEVEL

GST 201 NIGERIAN PEOPLES AND CULTURE (2 UNITS)

Nigerian history, culture and arts in pre-colonial times; Nigerians' perception of their world; culture areas of Nigeria and their characteristics; evolution of Nigeria as a political unit; indigene/settler phenomenon; concepts of trade; economic self- reliance; social justice; individual and national development; norms and values; negative attitudes and conducts (cultism and related vices); re-orientation of moral and national values; moral obligations of citizens; environmental problems.

GST 202 FUNDAMENTALS OF PEACE STUDIES AND CONFLICT RESOLUTION (2 UNITS)

Meaning and nature of conflict; causes and types of conflicts; conflict analysis, management, resolution and transformation; processes of conflict resolution peace education: the role of communication and language in conflicts; importance of the rules of conflict intervention latent stage of conflict and possible responses global issues and peace-building.

GST 203 INTRODUCTION TO PHILOSOPHY AND LOGIC (2 UNITS)

Nature and scope of philosophy, the traditional and special fields of philosophy; conceptions of the term 'philosophy; epistemology, metaphysics, ethics and logic

BIO 213 CHEMISTRY OF AMINO ACIDS AND PROTEINS (2 UNITS)

Structure, properties and classification of amino acids, pH, pka and buffer, peptide. Reactions of specific amino acids, separation of sequence of peptides, chemistry of proteins including their structural level and types of bonds stabilizing them, properties, functions and classifications of proteins, enzymes, vitamins and co-enzymes

BIO 216 CHEMISTRY OF CARBOHYDRATES, LIPIDS AND NUCLEIC ACIDS (2 UNITS)

Classification of physical properties of carbohydrates, structure of glucose, projection and perspective formular, structure of properties of other monossacharides, brief treatment of dissacharides and polyssacharides. Chemistry, classification and properties of lipids. Methods of analysis of lipids, lipoprotein, membrane and membrane structure. Chemistry of nucleic acids (Bases, Sugar and Phosphate acid). Structure and roles of RNA and DNA

CHM 201: PHYSICAL CHEMISTRY II (2 UNITS)

Kinetic theory of gases, behaviour of real gases; The laws of thermodynamic Entropy and free energy, reactions and phrase equilibrium; reaction rate laws for gases where the concentration of the reactions are the same. Mechanism and theories of unimolecular reactions.

CHM 202: ANALYTICAL CHEMISTRY I (2 UNITS)

Theory of errors, statistical treatment of data; Theory of sampling, chemical methods of analysis including volumetric (acid base, oxidation – reduction, precipitation and complexiметry); Physicochemical methods (Optical methods of analysis – UV/V), separation methods. pH notation and buffer solutions. Gravimetry solubility product and its application to separation methods of metals.

CHM 203: ORGANIC CHEMISTRY II (2 UNITS)

Factors affecting structure and physical properties of organic compounds; Factors affecting availability of electrons, Stereo-chemistry; Energy of activation and free radical substitution reactions in alkenes. Functional group chemistry. Electrophillic and nucleophillic substitution reactions. Aromaticity. Various type of organic reactions; e.g. addition, free radical, elimination and substitution reactions.

CHM 204: STRUCTURE AND BONDING (2 UNITS)

Idea of quantum states. Orbitals, shape and energy, simple valence theory. Electron repulsion theory; atomic spectra. The structure and chemistry of some representative main group element compounds.

CHM 205: INORGANIC CHEMISTRY II (2 UNITS)

Chemistry of first row transition metals. Introduction to co-ordination Chemistry including elementary treatment of crystal field theory. Comparative Chemistry of the following elements: Ga, In, TI, (b) Ge, Sn, Pb, (c) As, Sb, Bi (d) Se, Te, Po. Elementary introduction to Organometallic Chemistry. Role of metals in biochemical Systems

CHM 291: PRACTICAL CHEMISTRY III – INORGANIC CHEMISTRY (1 UNITS)

Inorganic chemistry practical based on CHM 205

CHM 292: PRACTICAL CHEMISTRY IV – ORGANIC AND PHYSICAL CHEMISTRY (1 UNITS)

Organic and physical chemistry practical based on CHM 201 and CHM 203.

MTH 212: LINEAR ALGEBRA II (2 UNITS)

Vector spaces. Liner independence. Basis, change of basis and dimension. Linear equations and matrices. Linear maps. The diagonal, permutation, triangular matrices. Elementary matrix. The inverse of a matrix. Rank and nullity. Determinants. Adjoint, cofactors, inverse matric. Determinantial rank. Crammer's rule. Canonical forms, similar matrics, Eigen values and vectors, quadratic forms.

MTH 281: MATHEMATICAL METHODS 1: (2 Units)

Real-valued functions of a real variable. Review of differentiation and integration and their applications. Mean value theorem. Taylor series. Real-valued functions of two or three variables. Partial derivatives chain rule, extrema, languages multipliers. Increments, differentials and linear approximations. Evaluation of line, integrals. Multiple integrals.

PHY 202: MODERN PHYSICS I (2 UNITS)

Atomic structure, Charge quantisation, Mass spectra, the plum pudding model, Rutherford model and Bohr models of the atom, Hydrogen spectra, Magnetic moment and Angular momentum of an atom, Electron spin, Pauli

exclusion principle and electronic configuration, X-ray spectra, Wave-particle duality, Nuclear structure: nomenclature, binding energy and stability, Radioactivity, The radioactive series, Accelerators, Detectors.

PHY 204: ELECTROMAGNETISM (2 UNITS)

Macroscopic properties of dielectrics: polarisation, Gauss's law in a dielectric, the displacement vector, boundary conditions on **D** and **E**, dielectric strength and breakdown; Capacitor: capacitance, the parallel plate capacitor, effect of a dielectric, energy stored in a dielectric medium, capacitors in series and parallel, practical capacitors; Microscopic properties of dielectrics: microscopic picture of a dielectric in a uniform electric field, determination of local field, Clausius-Mossotti equation, behaviour of dielectric in alternating fields; Magnetism of materials: response of various substances to a magnetic field, magnetic moment and angular momentum of an atom, diamagnetism and paramagnetism, Lamor precession, magnetisation of paramagnets, ferromagnetism, magnetic field due to a magnetised material, magnetic intensity, relationship between **E** and **H** for magnetic material, magnetic circuits.

300 LEVEL

GST302: Business Creation and Growth (2 credit Unit)

Concept of Business and New Value Creation: Business Planning Process; Start-up Decision – What Motivate people to begin new businesses; Opportunity Search and Identification; Legal Issues at Start-up; & Feasibility Analysis of New Ventures and New Venture Financing. Theories of Growth: An Overview: Concepts and Reasons of Growth; Challenges of Growth; Strategies for Growth (External Growth Strategies Franchising, Buy-In and Buy-Out); Mergers and Acquisition; Sources of Funds: Internal Sources and External Sources; Formal and Informal Sources; Efficiency in the use of Resources. Marketing: Concept of Marketing: Small and Big Business Marketing; Marketing Mix; Modern Marketing Tools. Ethics and Social Responsibility: The Importance of Ethics in Business; Ethical Behaviour and Practices in Nigeria; Community Development Projects/Walfare. New Opportunities for Expansion: E-Commerce; E-Business; E-Trade. Managing Transition: From Start up to Growth: Personal Disciplines; Learning; Decision Making; Control.

CHM 301: PHYSICAL CHEMISTRY III (3 UNITS)

Introduction to key thermodynamic functions and applications. First, second and third laws of thermodynamics, internal energy of a system: the carnot

heat engine; The concept of entropy and the criteria for spontaneity and equilibrium for physical and social processes including single and multiple comparism system. The concept of reversibility and irreversibility, free energy derivations, Maxwell relations, Gibbs functions. Equilibrium thermodynamic as (ideal solutions and vapour, fugacity concepts). Properties of electrolytes (colligate properties and phrase rule. Introduction to statistical thermodynamics

CHM 302: POLYMER CHEMISTRY I (2 UNITS)

The nature of Polymer nomenclature. Outline of sources of raw materials for polymers; Polymerization process, condensation polymerization in details. Solubility and solution properties of polymers. Structures and properties of polymers. Fibre forming polymers.

CHM 303: INORGANIC CHEMISTRY III (3 UNITS)

The noble gases. Hydrogen, electronic structure and general properties and comparative study of Group IA Group IIA elements. Chemistry of Boron: Carbon and Silicon, nitrogen and phosphorous, oxygen and sulphur. The halogens, and transition element, separation of metals. Coordination chemistry, Ligand and crystal field theories, Introduction to radio chemistry, radio activity and the periodic table.

CHM 304: COLOUR CHEMISTRY AND TECHNOLOGY (2 UNITS)

Colour and constitution. Chemistry, properties of dyes and pigments. Classification of dyes and fibres. Dyeing mechanisms. Preparation and dyeing of natural and synthetic fibres.

CHM 305: ORGANIC CHEMISTRY III (3 UNITS)

Alcohols and their reactions. Ethers and Epoxides. Carboxylic acids and their derivatives. Aldehydes and ketones. Carbanion, α and β – unsaturated compounds. Polyfunctional compounds. Heterocyclic chemistry. Stereochemistry**;** Chirality, enantomers, E and Z. cis and trans, conformations

CHM 306: INSTRUMENTAL METHODS OF ANALYSIS (2 UNITS)

Spectroscopic techniques, physicochemical optical; flame and X-ray methods. Fluorence method, magnetic resourance and electron spin resonance. Referchemistry and interferometry. florerimentry, polarography , calorimetry.

CHM 307: ATOMIC AND MOLECULAR STRUCTURE & SYMMETRY (3 UNITS)

Schrödinger equation. Helium atom, ground and excited states, spin and Pauli principles, hydrogen molecule, comparison of molecutar orbital and Valence bond theories; concepts of resonance and configuration of orbital for historic molecular, walsh rules. Rotational and vibrational bond length and angles. Brief mention of other methods, atomic spectra, Russell Sounder's coupling, orbital and spin angular momentum. Use of symmetry in chemistry. Heat capacities of solids. Theory of bonding in H^{2+} and H_2. Rotation and vibration of molecules. Heat capacities of crystals

CHM 309: ORGANIC SPECTROSCOPY (2 UNITS)

Principles and applications of UV, IR, NMR and Mass spectroscopy the determination and elucidation of structure of organic compounds.

CHM 311: PETROLEUM CHEMISTRY (2 UNITS)

Petroleum in the contemporary energy scene: Nature, classification and composition of crude petroleum and natural gases. Distribution of petroleum and natural gas resources (the global and Nigerian situations). Petroleum technology, survey of refinery products and process. Petrochemicals as industrials raw materials. Prospects for the petrochemical industry in Nigeria and LNG

CHM 312: INDUSTRIAL CHEMICAL PROCESSES I (2 UNITS)

Production of primary intermediates and synthesis of industrial organic chemicals; Polymers, adhesives, dyes, explosives, insecticides, pesticides, herbicides, flavouring agents and pharmaceutical. Fermentation process.

CHM 313: ORGANOMETALLIC CHEMISTRY I (2 UNITS)

Classification of organometalic compounds. Preparation, structure and reactions including abnormal behaviour of organmetalics. Generation and detection of free radicals from organometalic compounds.

CHM 314: ENVIRONMENTAL CHEMISTRY (2 UNITS)

Concepts of elementary cycles. Characteristics of the atmosphere. Sources, types and effects of environmental pollution. Waste water treatment.

Composition of domestic wastes. Water chemistry and analysis. Chemical and Physical instrumentation in environmental sciences.

CHM 315: CARBOHYDRATE CHEMISTRY (2 UNITS)

Classification, structure and nomenclature of carbohydrates. Sugars, general reaction; preparations and reaction mechanisms. Configurations. Epimerisation.

CHM 316: INDUSTRIAL CHEMICAL TECHNOLOGY I (2 UNITS)

Heat transfer and Mass transfer processes. Unit operations. Chemical technology equipment.

CHM 318: NATURAL PRODUCTS CHEMISTRY I (2 UNITS)

Terpenoids, carotenoids, steroids, alkaloids and lipids

CHM 391: PRACTICAL CHEMISTRY V -INORG AND ANALYTICAL (1 UNITS)

Inorganic and analytical chemistry practical, based on CHM 303 and CHM 202

400 LEVEL

CHM 402: THEORY OF MOLECULAR SPECTROSCOPY (2 UNITS)

Quantum theory of rotation and vibration. Theory of microwave, IR, Raman, UV, Visible and NMR spectroscopy. General introduction to electron spin resonance, Mossbauer effect, nuclear quadruple resonance and other modern techniques.

CHM 405: CHEMICAL THERMODYNAMICS (2 UNITS)

Equations of state for gases, intermolecular forces, The laws of thermodynamics, internal energy and entropy; criteria for equilibrium, free energy; partial molar quantities, the chemical potential; Chemical equilibrium in ideal and non-ideal systems; The thermodynamics of mixtures; Statistical mechanics: microstates and randomness, probability and distribution functions; The Boltzmann distribution; Statistical thermodynamics of gases.

CHM 406: NUCLEAR AND RADIOCHEMISTRY (2 UNITS)

Natural radioactivity, fusion, fission, decay process, nature of radiation. Nuclear models, energetic of nuclear reaction. Principles and measurement of radioactivity. Applications of radioactivity. Radiation Hazards.

CHM 407: REACTION KINETICS (3 UNITS)

Review of first, second and third order rate equations. Rate constants, and equilibrium constant collision theory, transition state theory, reaction coordinates. Unimolecular reaction theory, Bimolecular reaction mechanism: Chain reaction mechanisms; catalysis and heterogeneous reactions. Photochemical reactions mechanism.

CHM 408: POLYMER CHEMISTRY II (2 UNITS)

Polymerization mechanisms; detailed treatment of addition polymerization. Stereospecific polymerization. Copolymensation. Phase systems for polymerization. Industrially important thermoplastic and thermosetting polymers: Polyurethanes. Rubber elasticity. Mechanical properties of polymers. Analysis and testing of polymers. Degradation of polymers.

CHM 409: ELECTROCHEMISTRY (2 UNITS)

Electrical double layer, potential at zero charge, polarizable and non-polarizable interface, mass transport, concentration polarization, Fick's Laws, Levic equation. Electrodics. Polargraphy. Corrosion – types and prevention.

CHM 411: PROJECT (6 UNITS)

A laboratory research project in any area of chemistry

CHM 413: ANALYTICAL CHEMISTRY II (2 UNITS)

Theory of error-significance round correlation tests. Potentiometer and pH titrations. Conductometric methods, electrolytic methods, radiochemical methods. Chromatography Calorimetry.

CHM 414: PHOTOCHEMISTRY AND PERICYCLIC REACTIONS (2 UNITS)

Interaction of radiation with matter, electronic excitation, selection rules, deactivation routes, sensitization, quenching, photo fragmentation, oxidation, reduction, rearrangement, pericyclic reactions and molecular orbital symmetry

CHM 415: INDUSTRIAL CHEMICAL TECHNOLOGY II (2 UNITS)

Hydrogen and carbon monoxide -synthesis gas, oxoprocess, water gas, source of hydrogen and its application. Industrial organic materials, Raw materials, Technical and economic principles of processes and product routes. Flow diagrams. Selected oils and fats, soaps and detergents, sugar, varnishes, plastics, wood pulp and paper. Environmental pollution.

CHM 416: ORGANIC SYNTHESIS (2 UNITS)

Critical view of important reactions, reagents and methods including the mechanisms. Application of synthesis of important and complex organic compounds.

CHM 421: HETEROCYCLIC CHEMISTRY (2 UNITS). The Synthetic and mechanistic aspects of fused heterocyclic system-particularly Quinolines, Iso- quinolines, Benzofurans, Benzothiophenes, Indoles, Genzopyrylium salts, Coumarius and Chromones. Application of heterocyclic systems in drug synthesis.

CHM 422: NATURAL PRODUCTS CHEMISTRY II (2 UNITS)

Chemistry of terpenoids, steroids, and alkaloids, antibiotics, flavonoids. Prostaglandins and chlorophylls. Other natural products of pharmaceutical Importance. General methods of Isolation, separation, purification and structural determination of the natural products. Classifications. Discussion of chemistry of important members; Biogenesis.

CHM 423: COORDINATION CHEMISTRY (3 UNITS)

Definition, Recognition and Applications of Coordination compounds. Nomenclature, Coordination formula and Isomerism in complexes. Stereochemistry of complex molecules; Theories of structures and bonding. Physical methods of structural investigation. Magnetic properties. Absorption and Vibrational spectra. The spectrochemical series. The Nephelauxetic series and the Jahn-Teller distortions. Stabilization of unusual oxidation states by complex formation. Thermodynamic stability of complex compounds, the stability constant, the chelate effect. Preparation and reactions complexes. Kinetics and Mechanisms.

CHM 424 NON-AQUEOUS SOLVENTS: (2 UNITS)

Classification and General Characteristics, solute-solvent interaction. Protonic solvents. Oxyhalide solvents. Liquid halides. Divitrogen tetroxide, sulphur dioxide. Leveling effects, non-aqueous titrations.

CHM 426: CHEMISTRY OF LANTHANIDES AND ACTINIDES (2 UNITS)

The elements and the position of the two series in the periodic table. Comparison of the two series. Lanthanides contractions. The electronic configuration and their sequences on oxidation states, size relationship, magnetic properties and colour. Chemical properties and structure of the elements and their compounds. Recovery and separation of the elements. Uses of Lanthanides and Actinides.

Degree Award Requirements (Examples):

Table: BSc. CHEMISTRY: To graduate, a student shall have undergone at least 6-8 semesters of study depending on entry point, including field practical training. Students are to pass a minimum of 129 credit units for a 4-year B.Sc (Chemistry) programme; and 98 units for a 3-year B.Sc (Chemistry) programme, excluding the GST courses. The submission of an undergraduate project thesis based on a supervised research is a graduation requirement which cannot be compromised.

Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Formula for calculation of GPA and CGPA

$$CGPA = \frac{CGPE}{TCC}$$

CGPE is cumulative grade point earned
TCC is total credit carried

$$GPA = \frac{TPA}{TCC}$$

Class of Degree: Graduating class limits are as follows;

First class: 4.50 − 5.00
Second class upper division: 3.50 – 4.49
Second class lower division: 2.49 – 3.49
Third class: 1.4 – 2.48
Good Academic Standing: 1.50 and above

B.Sc. PHYSICS PROGRAMME

PROGRAMME AND DEGREE AWARD REQUIREMENTS
Programme Title: B.Sc Physics

1) **Programme: B.Sc. (Physics)**
   Programme Code: 5214

LIST OF ACADEMIC STAFF

S/N	NAME	SEX	DESIGNATION	E-MAIL	TEL. NO
1	Dr. Funmilayo Laosebikan AYEDUN	F	Lecturer I	fayedun@noun.edu.ng	08072960424
2	Mr. Effiong IBANGA	M	Lecturer II	eibanga@noun.edu.ng	08167306652
3	Prof.Saheed AJIBOLA	M	Dean/Prof.	sajibola@noun.edu.ng	07034400044
4	Dr. A. B. DISU	M	Lecturer I	adisu@noun.edu.ng	08179639252

A BRIEF HISTORY OF THE UNIT

Physics Unit is one of the pioneer units in the School of Science and Technology that was established as a servicing unit at the inception of the University in 2004. The unit continued in its servicing capacity until the 2011/2012 academic session when the full B.Sc. (Physics) progamme took off.

PHILOSOPHY

The philosophy of B.Sc. Physics Programme is to combine theories and practices leading to the production of graduates who are equipped with knowledge and skills to enable them meet the needs of their immediate environment and the world at large. The department aims to achieve this through the open and distance learning mode of instructional delivery by exploiting the combination of university's ODL infrastructure (physical and virtual), laboratories and collaboration with institutions, agencies and industries.

OBJECTIVES & AIMS

- ✓ To produce competent graduates of physics with sound knowledge and skills to contribute to the rapid technological growth of the Nigerian society and the word at large.

- ✓ To produce competent graduates who will seek to advance and exploit entrepreneurial opportunities in the field of Physics.

- ✓ To produce graduates who will utilize their knowledge of Physics, skills and abilities to enhance safety, health and welfare of the public through the simulation, construction and maintenance of industrial equipment.
- ✓ To produce graduates that will satisfy the manpower needs of our society in sectors of energy, industry, communication, science, engineering and research.

ADMISSIONS REQUIREMENTS

To be admitted into the B.Sc. Physics programme, a candidate is expected to possess at least one of the following:

i) Five (5) credit passes in Senior School Certificate Examination (SSCE) or at the School Certificate (SC), General Certificate of Education (GCE) Ordinary Level, National Examinations Council (NECO) or 6 merit passes in National Board for Technical Education (NABTEB) or Teachers Grade Two Certificate (TC II) examinations. The credit passes must include Mathematics and Physics. Credit pass in English language is required.

ii) General Certificate of Education (GCE) Advanced level in Mathematics and Physics for entry into 200 level of the programme.

iii) National Certificate in Education (NCE) with merit passes in Mathematics and Physics or Physics and Chemistry for entry into 200 level of the programme.

iv) National Diploma (N.D.) in the physical sciences or equivalent qualification from an institution recognized by Senate for entry into 200 level of the programme.

v) Degree or Higher National Diploma (HND) or equivalent qualification in any physical science from an institution recognized by Senate for entry into 200 level of the programme.
Note: All direct entry candidates must satisfy the ordinary level requirement.

DEGREE REQUIREMENT

Evaluation: There are two aspects to the assessment of this programme. First, there are tutor marked assignments as a Computer Based Test CBT (e-examination) which is 30% of the total course mark. At the end of the course, students would sit for a final

examination in accordance with the prevailing university regulation which has a value of 70% of the total course grade.

Structure of the Programme:

- ✓ **Course Credit System**

Subjects taught in the Unit are based on the 'course system' in which the subject areas are broken down into courses which are examinable. The courses are organized into levels (100-400 levels) in an order according to the academic progress.

- ✓ **Classification of Courses**

The courses in the Unit are classified as follows:

1. **Compulsory courses:** These are the core courses that must be offered by students and passed at a grade not below E
2. **Elective Courses:** These are optional courses which may be offered based on the interest of the student or for the purpose of fulfilling the minimum requirement for the award of the degree.
3. **General Studies Courses:** These consist of the university general studies courses coded GST. They are compulsory courses for all students of the university and are being offered by the University in compliance with the National University Commission (NUC) of Nigeria's directive.

- ✓ **Criteria for the award of B.Sc (Physics) degree**

The learner is required to **pass all compulsory courses** and complete a minimum of 170 credits to qualify to be admitted into the B.Sc. Physics degree. The compulsory courses are made up of those courses specifically labeled as **compulsory (C)** and the **required elective courses labeled as elective (E).**

OUTLINED PROGRAMME PROPOSAL (OPP)
B.Sc. Physics

100 Level

1st Semester

Course Code	Course Title	Unit(s)	Status
BIO101	General Biology I	2	C
BIO191	General Biology Practical I	1	C
CHM101	Introductory Inorganic Chemistry	2	C
CHM103	Introductory Physical Chemistry	2	C
CHM191	Introductory Practical Chemistry I	1	C
CIT 101	Computer in Society	2	C
GST 101	Use of English and Communication Skills	0	C
GST 107	The Good Study Guide	0	C
MTH101	General Mathematics I	2	C
PHY 101	Elementary Mechanics, Heat and Properties of Matter	3	C
PHY 103	Geometric and Wave Optics	2	C
PHY 191	Introductory Practical Physics I	1	C
	Total Credit Units	**18**	

2nd Semester

Course Code	Course Title	Unit(s)	Status
BIO102	General Biology II	2	C
BIO192	Introductory Practical Biology II	1	C
CIT 102	Software Application Skills	2	C
CHM102	Introductory Organic Chemistry	2	C
CHM192	Introductory Practical Chemistry II	1	C
GST 102	Use of English and Communication Skills II	0	C
MTH102	General Mathematical II	2	C
PHY102	Electricity, Magnetism and Modern Physics	3	C
PHY192	Introductory Physics Laboratory II	1	C
	Total Credit Units	**14**	

200 LEVEL

1st Semester

Course Code	Course Title	Unit(s)	Status
CIT 215	Introductory Programming Language	3	C
GST 201	Nigerian Peoples and Culture	0	C
GST203	Introduction to Philosophy & Logic	0	C
MTH 281	Mathematical Method I	2	C
PHY 201	Classical Mechanics I	3	C
PHY 203	Oscillations and Waves	2	C
PHY 205	Introduction to Space Physics	2	C
PHY 207	Thermodynamics	2	C
PHY 261	Geophysics I	2	E
PHY 291	Physics Laboratory I	1	C
STT 211	Probability Distribution I	3	C
	Total Credit Unit	**20**	

2nd Semester

Course Code	Course Title	Unit(s)	Status
MTH 210	Introduction to Complex Analysis	3	E
MTH212	Linear Algebra II	3	E
MTH 232	Elementary Differential Equations I	3	C
MTH282	Mathematical Method II	2	C
PHY 202	Modern Physics I	2	C
PHY 204	Electrodynamic I	2	C
PHY 206	Optics I	2	C
PHY 208	Network Analysis and Devices	3	C
	Total Credit Units	**17**	
	Students to take only one elective Course		

300 Level

1st Semester

Course Code	Course Title	Unit(s)	Status
GST301	Entrepreneurial Studies I	0	C
MTH303	Vector and Tensor Analysis	3	C
PHY301	Classical Mechanics II	3	C
PHY303	Special Relativity	2	E
PHY305	Energy	2	C
PHY307	Solid State Physics I	2	C
PHY309	Quantum Mechanics I	3	C
PHY310	Electronics II	2	C
PHY311	Kinetic Theory and Statistical Mechanics	2	C
PHY312	Mathematical Methods for Physics I	2	C
PHY361	Geophysics II	2	E
PHY351	Optoelectronics	2	E
PHY 391	Physics Laboratory II	1	C
	Total Credit Unit	**22**	
	Students to take only one elective course		

2nd Semester

Course Code	Course Title	Unit(s)	Status
PHY 302	Modern Physics II	2	E
PHY304	Electrodynamics I	2	E
PHY 306	Optics II	2	E
PHY308	Electronics I	2	C
PHY313	Mathematical Methods for Physics II	2	C
PHY 314	Numerical Computations	2	C
PHY362	Workshop Practice	2	C
PHY399	SIWES	6	C
	Total Credit Units	**16**	
	Students to take only one elective Course		

400 Level
1st Semester

Course Code	Course Title	Unit(s)	Status
PHY401	Elementary Particle Physics	3	C
PHY 405	Electronics III	3	C
PHY 407	Solid State Physics II	3	C
PHY 409	Quantum Mechanics II	3	E
PHY 451	Ionospheric Physics	3	E
PHY 455	Lower Atmospheric Physics	3	E
PHY457	Environmental Physics	3	C
PHY 461	Geophysics III	3	E
PHY499	Project	6	C
	Total Credit Units	**21**	
	Students to take only one elective Course		

2nd Semester

Course Code	Course Title	Unit(s)	Status
PHY400	Seminar	1	C
PHY 402	Nuclear Physics	3	E
PHY404	Electrodynamics I	3	C
PHY406	Optics III	3	C
PHY 408	Electronics IV	3	E
PHY492	Laboratory Physics III	1	C
PHY 454	Astrophysics	3	E
PHY 456	Nuclear Reactor Physics	3	E
	Total Credit Units	**11**	
	Students to take only one elective Course		

DETAILED PROGRAMME PROPOSAL (DPP)

BIO101 GENERAL BIOLOGY I (2 UNITS)

General characteristics, similarities, differences, distribution and economic importance of virus, Bacteria, fungi, lower green vascular plants. Ecological adaptation of various plant forms. Interrelationship of plants evolution and reproduction

BIO102 GENERAL BIOLOGY II (2 UNITS)

Systematic studies of diversity of life including monera, protista, plants (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and angiosperms) and animals (Protozoa, Platyhelminthes, Annelids, Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals) based on similarities and differences in external morphology. Taxonomic divisions of plant and animal kingdoms. Ecological adaptations of these forms.

BIO 191 GENERAL BIOLOGY PRACTICAL I (1 UNIT)

What practical work in biology involves. Laboratory organization. Handling common laboratory equipment. Microscopic handling and maintenance. Making microscopic measurements. Procuring animal materials for practical. Killing, preserving and maintaining animal materials. Procuring plant materials. External features of plants (differences and similarities). Preparation of temporary slides. Preparation of stains and reagents. Techniques for microbial culture and grain staining. Setting up demonstration for physiological processes in plants. Setting up apparatus for demonstrating physiological processes in animals. Preparation required for dissection.

BIO 192 GENERAL BIOLOGY LABORATORY II (1 UNIT)

Observation and description of the morphological and diagnostic features as well as the differences among the different phyla of the plant, animal, archebacteria, eubacteria, fungi and protista kingdoms. Identification of the taxonomic hierarchy of the members of the above groups. Study of the structure and functions of their parts and habitats specifications

CHM101: INTRODUCTORY INORGANIC CHEMISTRY (2 UNITS)

Hypothesis, theory and law with appropriate illustrations, Nature of matter – 3 states of matter, Atomic structure, electronic energy levels and orbital. Periodic classification of elements and its relationship to their electronic configurations, Chemical bonding, Survey of properties and trends in groups I, II, IV, VI and transition metal,

CHM 102: INTRODUCTORY ORGANIC CHEMISTRY (2 UNITS)

Simple reactions of hydrocarbons, alcohols, and acids. Petroleum chemistry, Oils and fats, hydrogenation of oils, polymer and biologically important molecule.

CHM103: INTRODUCTORY PHYSICAL CHEMISTRY (2 UNITS)

Mole concepts and calculations based on it, methods of expressing concentrations, Chemical Kinetics and equilibrium, and related calculations, Important application of equilibrium – pH, solubility products and solubility of ionic solids, Thermo chemistry and simple calculations based on Hess's law, Electrochemistry and working of various cells, Brief mentions of corrosion; chemical thermodynamics; $\Delta G = \Delta H - T\Delta S$

CHM 191: INTRODUCTORY PRACTICAL CHEMISTRY I (1 UNIT)

Practical based of CHM 101 and CHM 103: Cations and anions – identification, Acid- base titrations, Redox reactions and determinations

CHM 192: INTRODUCTORY PRACTICAL CHEMISTRY II (1 UNIT)

Practical based on general chemistry CHM 101 and introductory organic chemistry I CHM 102- Determination of melting and boiling points and reaction of functional groups.

CIT101: COMPUTERS IN SOCIETY (2 UNITS)

Introduction to Basic concepts of the Computer System; A survey of various uses of the Computer; Computer applications in the Modern Society; Effects of Computerization of the Workplace; Computer Ethnics and Security Issues, Classical examples of the effects of the internet on the society.

CIT102: APPLICATION SOFTWARE SKILLS (2 UNITS)

Brief description of computer system: CPU, I/O devices; Operating systems; Computer File Management; Computer Software: overview, types, etc.; Application software: common application software; Using Microsoft Word; Using Microsoft Excel; Features of Database Applications and Microsoft Access; Statistical Analysis Applications; Using SPSS software; Introduction to Desktop Publishing applications; Computer applications in Nursing; Computer applications in Agriculture; Managing the computer system with the Control Panel. Protection.

GST101: USE OF ENGLISH AND COMMUNICATION SKILLS I (2 UNIT)

Listening enabling skills, listening and comprehending comprehension, note taking and information retrieval. Including data, figures, diagrams and charts. Listening for main idea, interpretation and critical evaluation. Effective reading. skimming and scanning. Reading and comprehension at various speed levels. Vocabulary development in various academic contexts. Reading diverse texts in narratives and expository. Reading and comprehension passages with tables, scientific texts. Reading for interpretation and critical evaluation.

GST102: USE OF ENGLISH AND COMMUNICATION SKILLS II (2 UNITS)

Writing paragraphs: Topic sentence and coherence. Development of paragraphs: illustration, Description, cause and effect including definitions. Formal letters; essential parts and stylistic forms, complaints and requests; jobs, ordering goods, letters to government and other organizations. Writing reports; reporting event, experiments. Writing summaries: techniques of summarizing letters and sounds in English, vowels and consonants. Interviews, seminar presentation, public speech making, articles, concord and sentences including tenses. Gerund, participles, active, passive and the infinitive. Modal auxiliaries.

GST107: THE GOOD STUDY GUIDE (2 UNITS)

Getting started: How to use the book, why read about skills, getting yourself organised ; what is studying all about, reading and note taking; Introduction, reactions to reading, your reading strategy, memory, taking notes, conclusion. Other ways of studying: Introduction,

learning in groups, talks and lectures, learning from TV and radio broadcasts, other study media. Working with numbers; Getting to know numbers, describing the world, describing with the tables, describing with diagrams and graphs; What is good writing? The Importance of writing, what does an essay look like, what is a good essay? Conclusion. How to write essays: Introduction, the craft of writing, the advantages of treating essay writing as a craft, making your essay flow, making a convincing case, the experience of writing. Preparing for examination.

MTH101: GENERAL MATHEMATIC I (2 UNITS) (ALGEBRA AND TRIGONOMETRY) Elementary set theory, subsets, union, intersection, complements, Venn diagrams; Real numbers; integers, rational and irrational numbers, mathematic I, induction real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; Algebra of complex numbers; the Argand Diagram; Re Moivre's theorem; nth roots of unity. Circular measure; trigonometric functions of angles of any magnitude, addition and factor formulae

MTH102: GENERAL MATHEMATICS II (3 UNITS)
Calculus: 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.

PHY101: ELEMENTARY MECHANICS, HEAT AND PROPERTIES OF MATTER (3 UNITS)
Space and Time: Physical quantities: Units and dimensions of physical quantities; Kinematics: Uniform velocity motion, uniformly accelerated motion; Dynamics: Newton's laws of motion; Impulse and Linear Momentum, Linear Collision, Newton's universal law of gravitation; Work, energy and power; Conservation laws; Concept of

mechanical equilibrium; Centre of mass and centre of gravity; Moment of a force; Rotational kinematics and dynamics: Torque; Moment of Inertia; angular momentum; Total mechanical energy. Simple harmonic motion

Heat and temperature, work and heat, Quantity of heat: heat capacities, latent heat; Thermal expansion of solids, liquids and gases; Gas laws, heat transfer; Laws of thermodynamics: Isothermal and Adiabatic changes, Carnot cycle; Application kinetic theory of gases; van der Waals gas.

Classification of matter into (solids, liquids and gases, forces between atoms and molecules, molecular theory of matter, Elasticity, plasticity, Hook's Law, Young's Shear and bulk Moduli) Crystalline and non-crystalline materials, Hydrostatics: pressure, buoyancy, Archimedes' principle; Hydro-dynamics-streamlines, Bernouli and Continuity equations, turbulence, Reynold's number, Viscosity, laminar flow, Poiseuille's equation; Surface tension, adhesion, cohesion, capillary, drops and bubbles.

PHY102: ELECTRICITY, MAGNETISM AND MODERN PHYSICS (2 UNITS)

Electrostatics: Coulomb's law, Gauss's law, potential and capacitance, dielectrics, production and measurement of static electricity. Current: Ohm's law, resistance and resistivity, heating. Galvanometers, Voltmeters and Ammeters; D.C. circuits: sources of emf and currents, Kirchhoff's laws; Electrochemistry; The Earth's magnetic field; Magnetic fields and induction, Faraday's and Lenz's laws; Force on a current-carrying conductor. Biot-Savart law. Flemming's right and left-hand rules, motors and generators. A.C. Theory. Atomic structure; Production and properties of X-rays; Radioactivity; Photoelectric emission.

PHY103: GEOMETRIC AND WAVE OPTICS (2 UNITS)

Geometrical Optics: law of reflection and refraction; Location of images: Plane and curved mirrors; Converging and diverging thin lenses; Thick lenses; Lens defects; Aberrations; The eye; Optical instruments. Simple Harmonic motion; Wave motion and wave types; Dispersion; Production of sound in strings and pipes resonance, applications; Simple description of diffraction and interference, applications to both light and sound waves; Polarization of transverse waves.

PHY191: INTRODUCTORY PHYSICS LABORRATORY I (1 UNIT)

Graphs, Measurement, Error Analysis, Determination of Acceleration due to Gravity by Means of Simple Pendulum, Determination of force constant of a spiral spring, Determination of effective mass of a spiral spring and the constant, Determination of surface tension of water, Determination of specific latent heat of fusion of ice, Determination of the co-efficient of limiting static friction between two surfaces, Determination of the co-efficient of static friction on two surfaces using an inclined plane, Determination of Relative Density of kerosene using the specific Gravity Bottle,

PHY192: INTRODUCTORY PRACTICAL PHYSICS II (1 UNIT)

Refraction through the glass block; Image formed by a concave mirror; Determination of the focal length of the convex mirror; Refraction through the triangular prism; Determination of the focal length of a converging lens and the refractive index of groundnut; Determination of resistance of resistors in series and in parallel in simple circuits; Determination of internal resistance of a dry cell using a potentiometer; To compare the E.M.F. of cells using potentiometer; Determine the unknown resistance of a resistor using Wheatstone Bridge; To determine the relationship between current through a Tungsten and a potential applied across it.

CIT215: INTRODUCTION TO PROGRAMMING LANGUAGES (3 UNITS)

FORTRAN programming language; Comparison of various versions of the language. Programming exercises using FORTRAN with emphasis on scientific application problems. Elements of Pascal language. Exercises in Pascal Programme structures and programming concepts; Structured design principles; abstraction, modularity, stepwise refinement, structured design techniques teaching of a structured programming language, e.g. PASCA/JAVA, C^{++}.

GST201 NIGERIAN PEOPLES AND CULTURE (2 UNIT)

Nigerian history, culture and arts in pre-colonial times; Nigerians' perception of their world; culture areas of Nigeria and their characteristics; evolution of Nigeria as a political unit; indigene/settler phenomenon; concepts of trade; economic self- reliance; social justice; individual and national development; norms and values; negative attitudes and conducts (cultism and related vices); re-orientation of moral and national values; moral obligations of citizens; environmental problems.

GST203: INTRODUCTION TO PHILOSOPHY AND LOGIC (2 UNIT)

General introduction to logic; clarity of thought; expression and arguments as basis for conclusion. Fundamentals of logic and critical thinking, types of discourse, nature of arguments; validity and soundness ; distinction between inductive and deductive inferences etc; illustrations from familiar texts, including literature materials, novels, law reports and newspaper publications.

MTH210: INTRODUCTION TO COMPLEX ANALYSIS (3 UNITS)

Complex number, the topology of complex plane. Limits and continuity of function of complex variables, properties and example of analytic functions, branch-points, Cauchy-Riemann equations. Harmonic function.

MTH211: INTRODUCTION TO SET THEORY AND ABSTRACT ALGEBRA (2 UNITS)

Set: Binary operations, mapping, equivalence relations integers: Fundamental theorem of arithmetic, congruence equations, Euler's function (n) Group Theory: Definition and examples of groups. Subgroups, coset decomposition, Lagrange's theorem. Cyclic groups. Homeomorphisms, isomorphism. Odd and even permutations. Cayley's theorem. Rings: Definition and examples of rings. Commutative rings. Integral domain. Order, well-ordering principles. Mathematical induction.

MTH212: LINEAR ALGEBRA II (3 UINTS)

Vector spaces; Liner independence. Basis, change of basis and dimension; Linear equations and matrices. ; Linear maps. The diagonal; permutation; triangular matrices. Elementary matri;. The inverse of a matrix; Rank and nullity. Determinants; Adjoint, cofactors, inverse matric. Determinantial rank. Crammer's rule. Canonical forms, similar matrices, Eigen values and vectors, quadratic forms.

MTH232: ELEMENTARY DIFFERENTIAL EQUATION I (3 UNITS)

Introduction; equation of first order and first degree, separable equations, homogeneous equations, exact equations, linear equations, Bernoulli's and Riccati equations. Applications to mechanics and electricity; Orthogonal and oblique trajectories. Second order equations with constant coefficients.

MTH281 MATHEMATICAL METHOD I (3 UNITS)

Sequences and Series; Limits, Continuity, Differentiability, Implicit Functions, Sequences, Series, Test For Convergence Sequences And Series Of Functions .Calculus, Partial Differentiation, Total Derivatives, Implicitly Function, Change Of Variable, Talyor's Theorem And Maxima And Minimum Functions Of Two Variables, Lagrangian Multiplier. Numerical Methods; Introduction to Iterative Methods, Newton's Method Applied To Finding Roots. Trapezium and Simpson's Rules of Integration.

PHY201: CLASSICAL MECHANICS I (3 UNITS)

Vector Analysis; Review of coordinate transformations; Particle kinematics and dynamics, Many particle systems; Central force: Motion in a central force field; Central-conservative forces; Kinematics in polar coordinates; Energy conservation in central-conservative force-field; Planetary Motion; Keplerian case; Rigid body dynamics. Newtonian gravitation; Conservatives and potentials; Defects of Newtonian mechanics and the essence of special relativity.

PHY202: MODERN PHYSICS I (3 UNITS)

Atomic structure: Experimental basis of quantum theory: Black body radiation; electrons and quanta; Charge quantization, Mass spectra, the plum pudding model, Rutherford model and Bohr models of the atom, Hydrogen spectra, Magnetic moment and Angular momentum of an atom, Electron spin, Pauli Exclusion Principle and electronic configuration, X-ray spectra, De Broglie hypothesis, the uncertainty principle; Wave-particle duality, Schrodinger's equation and simple applications; Nuclear Structure: nomenclature, binding energy and stability, Radioactivity, The radioactive series, Accelerators, Detectors. Bohr's theory of atomic structure;

PHY203: OSCILLATIONS AND WAVES (2 UNITS)

Simple harmonic motion, Superposition of simple harmonic oscillations, Damped harmonic motion, Forced oscillations and resonance, Coupled oscillations, Wave motion, Waves at the boundary of two media, Superposition of waves.

PHY204: ELECTROMAGNETISM (2 UNITS)

Macroscopic properties of dielectrics: polarisation, Gauss's law in a dielectric, the displacement vector, boundary conditions on **D** and **E**, dielectric strength and breakdown; Capacitor: capacitance, the parallel plate capacitor, effect of a dielectric, energy stored in a dielectric medium, capacitors in series and parallel, practical capacitors; Microscopic properties of dielectrics: microscopic picture of a dielectric in a uniform electric field, determination of local field, Clausius-Mossotti equation, behaviour of dielectric in alternating fields; Magnetism of materials: response of various substances to a magnetic field, magnetic moment and angular momentum of an atom, diamagnetism and paramagnetism, Lamor precession, magnetization of paramagnets, ferromagnetism, magnetic field due to a magnetized material, magnetic intensity, relationship between **E** and **H** for magnetic material, magnetic circuits.

PHY205 INTRODUCTION FOR SPACE PHYSICS (2 Units)

Introduction to Astronomy and Astrophysics, Satellite Communication, introduction to atmospheric Science, Space Environment, Space craft systems and Dynamics, Aero/Astrodynamic Engineering, Rocket Engineering, Cosmology, Origin of universe and life, Space Law and Business development.

PHY206: OPTICS I (2 UNITS)

Nature of light: the corpuscular model, the wave model, light as an electromagnetic wave; Reflection and refraction of light: electromagnetic waves at the interface separating two media, idealization of waves as light rays, Fermat's principle; Perception of

light: human vision, colour vision; Polarization of light: simple states of polarized light, principles of producing linearly polarized light, wave plates.

PHY207: THERMODYNAMICS (2 UNITS)

Basic concepts of thermodynamics; Measurement of temperature; The First Law of Thermodynamics; Entropy and the Second Law of Thermodynamics; Consequences of the first and second laws; Carnot engine; Combined first and second laws; Helmholtz and Gibb functions, Enthalpy, The thermodynamic potentials; phase transitions; Production of low temperatures and the Third Law.

PHY208: NETWORK ANALYSIS AND DEVICES (2 UNITS)

Circuit analysis: circuit elements, Kirchhoff's laws, complex impedances, current-voltage source transformations, circuit theorems; ac and dc circuits: resonant circuits, impedance matching, theory of passive filters, attenuators; Electron devices: vacuum tubes, semiconductor materials, p-n junction diodes, transistors.

PHY261: GEOPHYSICS I (2 UNITS)

Gravity methods: Newton's gravitation, applications; Instruments: gravimeters, zero-length spring; Densities: rocks and ores; Magnetic methods: definitions, concepts; Geomagnetism: origin, properties of rocks; Gravity and magnetic field survey: instruments, data processing, interpretations; The earth: internal structure and constitution; Field work.

PHY291: PHYSICS LABORATORY I (1 UNIT)

Measurement; Error Analysis; Investigation of the Dependence of the Period of a Pendulum on Length, Amplitude and Mass; Oscillations of a Spring-Mass System and a Torsional Pendulum; A Study of Energy and Momentum Conservation Principles; A Study of Coupled Oscillations; Relation between Wavelength and Frequency of

Stationary Waves; Young's Modulus for a Material by Bending of Beams; Measurement of Low Resistance using Carey Foster's Bridge; Variation of Thermo-E.M.F. with Temperature; Frequency Response of A.C. Series Circuits; Zener Diode Characteristics and Zener as A Voltage Regulator; A Study of Transistor Characteristics.

STT211: PROBABILITY DISTRIBUTION I (3 UNITS)

Discrete sample spaces: Algebra and probability of events, combinatorial analysis. Sampling with and without replacement. Conditional probability, Bayes theorem and stochastic independence. Discrete distributions: Binomial, Poisson, negative binomial-hyper geometric and multinomial. Normal approximation to binomial and Poisson, Poisson approximation to binomial. Random variables and expectations: mean, variance, covariance. Probability generating function and moment generating function. Chebychev,s inquality. Continuous joint distributions: marjind as conditional density. Expectations**:** movement**,** movement generating functions. Uniform, normal, beta, Cauchy and hop- normal distributions.

MTH303: VECTOR AND TENSOR ANALYSIS (3 UNITS)

Vector algebra, Vector dot and cross products; Equation of curves and surfaces. Vector differentiation and application; Gradient; divergence and curl; Vector integration, line, surface and volume integrals; Green Stokes's and divergence theorems; Tensor products and vector spaces tensor algebra; symmetry; Cartesian tensors.

PHY301: CLASSICAL MECHANICS (3 UNITS)

Motion under central conservative forces; scattering; Motion in non-inertial frames of reference, Generalized coordinates, Constraints, The Lagrange formulation of mechanics, Hamilton's formulation of mechanics.

PHY302: MODERN PHYSICS II (3 UNITS)

The hydrogen atom; relativistic effects and spin; Identical particles and symmetry; Many electron atoms; Properties of atomic orbits; Optical spectra of the hydrogen atom; Spontaneous and simulated emissions (lasers and masers); Spectra of alkali metals; Quantum effects; Coupling schemes and vector model: j-j couplings. Bohr magneton; Space quantization; Stern Gerlach experiment; Zeeman effect; Hyperfine structure and isotopes and nuclear spin; Nuclear spin number; Molecular spectroscopy: rotation, vibration-rotation, electronic The diatomic molecule; the Frank-Condon principle. X-ray spectra; Microwave methods; Resonance phenomena, ESR, NMR; Optical pumping and Mossbauer scattering.

PHY303: SPECIAL RELATIVITY (2 UNITS)

Einstein's postulates and Lorentz transformation; Consequences of transformations of momentum and energy; Experimental verification of special relativity; Velocity addition theorem and Doppler effect; Electromagnetic 4-vector; Transformation of **E** and **H**; Lorentz force.

PHY304: ELECTRODYNAMICS I (2 UNITS)

Electrostatics and magnetostatics: Lapace equation and boundary value problems; Multiple expansion; Maxwell's equations and electromagnetic potentials; Maxwell's wave equations; Conservation laws.

PHY305: ENERGY (2 UNITS)

Energy and power: principles, demands and outlook, transformation of energy and its costs; Thermal pollution; Electrical energy from fossil fuels; Hydro-electric generation: principles and problems, capacity, storage, reserves, efficiency and environmental effects; Electrical energy nuclear reactors: energy in future breeder reactors, fusion power, solar power, geothermal power, tidal power, etc.

PHY306: OPTICS (2 UNITS)

Interference by division of wavefront; Interference by division of amplitude; Interferometry; Fresnel diffraction; Fraunhofer diffraction; Diffraction gratings; Diffraction and resolution.

PHY307: SOLID STATE PHYSICS I (2 UNITS)

Crystal structure of solids; Crystal binding; X-ray diffraction in crystals, applications; Thermal properties of the crystal lattice; Elastic properties; Lattice vibrations: phonons; Free-electron theory of metals; Motion of electrons in periodic fields; Hall effect; Energy bands; Semiconductors; Superconductivity.

PHY308: ELECTRONICS I (3 UNITS)

Amplifiers: Classification of amplifiers, equivalent circuit of transistor, operating point and bias stability, operating point and bias stability, small signal amplifier, r-f amplifiers; Oscillators: negative feedback, positive feedback, LC oscillators, RC oscillators; Power supply: power source, dc power unit, performance of rectifier, filter circuits, regulation of output voltage; Linear integrated circuits: the Op Amp and its applications, amplifiers and voltage regulators.

PHY309: QUANTUM MECHANICS I (3 UNITS)

Experimental basis of quantum theory: blackbody radiation, and Planck's hypothesis, electron and quanta; Operators; Postulates of Quantum Mechanics; Correspondence principle, Schroedinger equations and their solutions; Applications: one-dimensional box problem, potential well and bound states, potential barrier, the tunnel effect; The harmonic oscillator.

PHY310: ELECTRONICS II (2 UNITS)

Multistage amplifiers; Power amplifiers; Classes A, B, C, Active and Passive Filters; Power systems: Use of transistors in stabilized power supplies; Field effect transistors.

PHY311: KINETIC THEORY AND STATISTICAL MECHANICS (2 UNITS)

Ideal gases; Transport phenomena; Brownian motion; Real gases; Basic concepts of Statistical Mechanics; the partition function, entropy and probability, equipartition of energy, classical statistics, quantum statistics; condensed states, phase transformations, Applications.

PHY312: MATHEMATICAL METHODS FOR PHYSICS I (2 UNITS)

Series, solution of second order linear equations. Special Functions: The gamma function; Beta function; Legendre functions; Bessel functions; Hermite and Languerre function, The Dirac Delta function. hypergeometric functions; Sturm Liouville problems; Orthogonal polynomial and functions; Bessel's and Fourier-Legendre series; Legendre polynomials; Hermite polynomials; Laguerre polynomials. Expansion in series of orthogonal functions; Integral Transforms and Fourier Series: Fourier series and Fourier transforms; Laplace transform; Applications of transform methods to the solution of elementary differential equations of interest in physics and engineering; Partial differential equations; solution of wave and heat equations by Fourier method; Application of Fourier to PDEs;

PHY313: MATHEMATICAL METHODS FOR PHYSICS II (2 UNITS)

Linear Algebra and Functional Analysis; Transformations in linear vector spaces and matrix theory. Hilbert space and complete sets of orthogonal functions; Functions of a complex variable, analyticity, Complex integration; The residue theorem and its applications; conformal mapping; The eigenvalue problem for matrices; Diagonalisation of matrices; Introduction to tensors; Integral equations; Basic notions of group theory; Applications of group theory.

PHY 314: NUMERICAL COMPUTATIONS (2 UNITS)

Errors in numerical computations; Curve fitting; Solution of linear systems of equations; Numerical integration; Numerical solution of ordinary differential equations; Calculus of finite difference; Elements of C++ programming.

PHY351: OPTOELECTRONICS (2 UNITS)

Modulation of light: optical activity electro and magnetic optic effects and devices: Faraday effect, Kerr effect, Acousto-optic effect; Non-linear optics; Lasers: concepts; optical pumping; feedback; population inversion; Classes: doped, gas, liquid, semiconductor; Display devices and photoelectrons: Luminescence; Photoluminescence; photo-conductive detectors; Fibre optics and communication: concepts; fibre optical waveguides; planar dielectric wave guide; step index Fibres: intermodal dispersion; Losses in fibres; Integrated optics.

PHY 361: GEOPHYSICS II (2 UNITS)

Seismic Methods: Elastic properties of rocks; Wave propagation in elastic media; Refraction and Reflection. Seismic: horizontal and inclined multiple interface; instrumentation; field procedures; Velocity Analysis; Methods of processing and interpretation; Application in oil and water prospecting; Borehole Geophysics.

PHY391: PHYSICS LABORATORY II (1 UNIT)

A study of Network Theorems; Calibration of a thermistor and determination of energy gap; Construction and characterisation of power supplies & filters; Study of OPAMP as Summing and Inverting amplifiers; Study of OPAMP as Differentiator and Integrator; Detection and measurement of charge using an OPAMP; Study of some properties of lenses; Spectral analysis using a prism spectrometer; Interference of light- Young's experiment; Spectral analysis using a grating spectrometer; Production, detection and

reflection of polarized light; Study of interference of polarized light; Measurement of Cp/Cv by an acoustic method; Phase change.

PHY399 SIWES (6 UNITS)

This is a compulsory course designed to train the students on the Industrial application of Physical knowledge. The course will be undertaken within the country at laboratories, research institutes and industrial plants concerned with physical processes and related fields. Each student will be supervised at least once while on attachment by a designated staff of the school.

GST301: ENTREPRENEURIAL STUDIES I (2 UNIT)

Introduction to entrepreneurship and new venture creation; Entrepreneurship in theory and practice; The opportunity, Forms of business, Staffing, Marketing and the new venture; Determining capital requirements, Raising capital; Financial planning and management; Starting a new business, Feasibility studies; Innovation; Legal Issues; Insurance and environmental considerations. Possible business opportunities in Nigeria. knails, screws making Dyeing/Textile blocks paste making.

PHY400: SEMINAR (1 UNIT)

Student reports on an assigned or chosen current topic in Physics. Review of literature on the assigned topic should be included. Assessment to be on written report and oral presentation.

PHY401: ELEMENTARY PARTICLE PHYSICS (2 UNITS)

Elementary particles: types; Conservation laws; Particle classification. Strong, electro-magnetic and weak interactions; Particle resonances; Symmetry models: SU (2), SU(3), etc.

PHY402: NUCLEAR PHYSICS (3 UNITS)

Basic nuclear concepts: structure, size, nuclear masses, nuclear forces; Nuclear scattering: nuclear models; Energy spectra of alpha and beta decays; Fermi theory of -decay; Emission; internal conversion; Nuclear reactions; Interaction of nuclear radiation with matter.

PHY404: ELECTRODYNAMICS II (2 UNITS)

Propagation of plane waves in unbounded isotropic media; reflection, refraction; Transmission lines; Wave guides and resonant circuits; Radiation from an oscillating dipole; Radiation from moving charges.

PHY405: ELECTRONICS III (2 UNITS)

Number systems and codes; Fundamentals of Boolean algebra and flip-flops; Registers counters, memory circuits and analogue/digital converters; Electronic instruments

PHY406: OPTICS III (2 UNITS)

Coherence; Physics of Lasers: Light emission and absorption, prerequisites for a laser, types of lasers, applications; Holography: the principle, the process, applications; Fibre optics: optical fibre, optical communication through fibres.

PHY407: SOLID STATE PHYSICS II (2 UNITS)

Dielectric properties; Magnetism: paramagnetism and diamagnetism, ferromagnetism and anti-ferromagnetism. Magnetic resonance; Imperfections in solids

PHY408: ELECTRONICS IV (3 UNITS)

High input impedance circuits; High frequency oscillators; Modulation and detection; Amplitude Modulation: Square law modulator and detector, switching modulator, envelope detector, double sideband

suppressed carrier (DSBSC) modulation, generation of balanced modulator, ring modulation, coherent detector of DSBSC waves, double-balanced modulator; Single sideband modulation (SSB) and demodulator; Vestigal sideband modulation (VSB); Frequency modulated (FM) systems.

PHY409: QUANTUM MECHANICS II (3 UNITS)

Three-dimensional spherical symmetric potentials; Angular momentum and spin of atomic and nuclear particles; Dirac Notation; Multi-electron atoms; Perturbation theory; scattering theory; elastic potential scattering; Green's function and method of partial waves, Applications.

PHY492: PHYSICS LABORATORY III (1 UNIT)

400 Level practical in Pure and Experimental Physics

PHY451: IONOSPHERIC PHYSICS (3 UNITS)

The sun and formation of ionized layers; Formation and Structure of D, E and F layers of the ionosphere; Vertical and Oblique propagation of radio waves in the ionosphere; Ionospheric absorption and fading; Ionospheric disturbances.

PHY454: ASTROPHYSICS (3 UNITS)

Structure, origin, evolution of stars, galaxies, planets; Stellar Interiors-Equations, Solar model; Stellar Atmospheres-Abundance of Elements; Solar Radiation; Atmospheres.

PHY455: LOWER ATMOSPHERIC PHYSICS (3 UNITS)

Atmospheric composition and structure; Thermodynamics of water vapour and air; Hydrostatic stability and convection; tephigrams; gradient winds. Radiation in the atmosphere: absorption, scattering;

Absorption spectra: electronic, vibrational, rotational; Lines and Bands; Broadening processes; pressure/collision; Doppler; Radiometric quantities; definitions and measurements; Radiative transfer equation.

PHY456: NUCLEAR REACTOR PHYSICS (3 UNITS)

Neutron Physics, Flux cross sections; Thermalisation; Fundamentals of thermonuclear reactions, nuclear reactions- Homogeneous and Heterogenous Nuclear reactions – Operation and Control; Reactor Parameters and Control. Reactor Parameters and Critical Sizes; Reactor Kinetics

PHY457: ENVIRONMENTAL PHYSICS (3 UNITS)

Satellite orbits; remote sensing; processing and resolution of satellite images; applications of remote sensing data; structure and composition of earth's atmosphere; energy balance; greenhouse effect and global warning; atmospheric motion, pressure gradient and thermal gradient winds; global weather and climate patterns; environmental modeling; environmental risk-benefit analysis.

PHY461: GEOPHYSICS III (3 UNITS) PREREQUISITES: PHY261

Electrical and electromagnetic methods; Electrical properties of rocks: resistivities and conductivities; Electrical profiling: sounding and interpretations; Electromagnetic methods: classification, applications in geological mapping, groundwater and conductive mineral exploration; Tonnage and quality estimation. Field work.

PHY499: PROJECT (6 UNITS)

Each student, in consultation with a Departmental academic staff, will select a specific problem in Physics discipline to be his/her project and will write a research proposal at the beginning of the first semester of

level 400. The student will learn how to design, carry out, and evaluate the results of a research project in the university laboratory and/or in the field and at the end, to write and present a seminar on the results of his research project to graduates and staff of the School.

Minimum Course Credits for Graduation: Minimum of 120 credit units for a 4-year B.Sc (Physics) programme; and 90 units for a 3-year B.Sc (Physics) programme, excluding the GST courses.

General Studies Courses (GST): They are university compulsory courses that must be offered and passed before graduation.

Compulsory General courses for Programmes in the Faculty of Sciences: BIO 101, BIO 191, BIO 102, BIO 192, CHM 101, CHM103, CHM 191, CHM 102, CHM 192, CIT 101, CIT 102, MTH 101, MTH 102, PHY 101, PHY 102, PHY 191,PHY 192,

Degree Award Requirements (Examples):
BSc. PHYSICS: To graduate, a student shall have undergone at least 6-8 semesters of study depending on entry point, including field practical training. Students are to pass a minimum of 147 credit units for a 4-year B.Sc. (Physics) programme; and 120 units for a 3-year B.Sc. (Physics) programme, including the GST courses. The submission of an undergraduate project thesis based on a supervised research is a graduation requirement which cannot be compromised.

Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Formula for calculation of GPA and CGPA:

$$CGPA = \frac{CGPE}{TCC}$$

CGPE is cumulative grade point earned
TCC is total credit carried

$$GPA = \frac{TPA}{TCC}$$

Class of Degree: Graduating class limits are as follows:

First class: 4.5 -5.00
Second class upper division: 3.5 – 4.49
Second class lower division: 2.49 – 3.49
Third class: 1.50 – 2.48

APPENDICES

Appendix I: Guidelines for Research Project and Grading Specifications

Guideline for Research project is as follows:

i) Research Proposal Title
ii) Research Proposers (names and addresses)
iii) Rational for the study (justification)
iv) Literature Review
v) Objective of study
vi) Materials and Method
vii) Expected Outcome
viii) Work Plan; and
ix) Budget.

Course listing

Refer to 2.2

Appendix II: Policy on Deferment of Examination

In the spirit of Open and Distance Learning (ODL) and the flexibility that comes with the mode, a student is qualified to apply for deferment of examination(s). The deferment permits a temporary postponement of participation in examination(s).
The guidelines of the policy include and not limited to the following:

A. Owing to the peculiarities of the Open and Distance Learning system which gives room for flexibility, students are allowed to defer their examinations as long as the following conditions are met:
i. Such students must have fully registered for the semester
ii. Such students must have registered for the Examinations
iii. Application for deferment must be received before the start of Examinations

B. All applications are to be endorsed and forwarded to the Registrar through the Study Centre Directors.

C. All applications should be backed with relevant documents and a desk officer in the Registry is assigned to check the authenticity of the documents.

D. Students whose applications are received and approved and who have paid examination registration fees before the examinations are not to pay registration fee for the same examinations when they are ready to take them.

E. A dedicated portal would be opened within the time frame of one month before the commencement of examinations for deferment cases.

F. The request for deferment attracts no fee.
Applications for deferment as a result of emergencies such as illness, accident, Death or serious illness of person in the immediate family or other person with whom the student has a similarly close relationship, which requires the student's attention, etc shall be addressed at the discretion of the Management.

This policy took effect in March 2015.

Appendix III: Policy of Re-marking of Students' Examination Scripts and Re-computation of results.

Appeal against examination results should be done within 30 days from the date of publication of the results;

(i) All applications for re-marking should be addressed to the Registrar through the Study Centre Directors and a copy forwarded to the Dean in the School concerned;

(ii) Applicants must submit the necessary application form (Annexure A) at the relevant Study Centre. Students must ensure that the course(s) code(s) title(s) are correct when completing the form;

(iii) A non-refundable fee of **₦10, 000.00** is charged per course for the re-marking of scripts. The said amount should be paid to a bank account designated for the purpose.

(Annexure A).
Students should note that the evidence of payment of the fees must be attached to a completed application form. Also payments without application forms would not be processed.

(iv) A receipt must be issued as proof of payment for the service;

(v) Study Centre Directors should, in all cases, ensure and supervise that payment for applications are received, receipts are issued and that all the applications are recorded;

(vii) Study Centre Directors are required to forward all applications to the Registrar electronically within three days of receipt of the application form. The e-mail address is **academicoffice@noun.edu.ng;**

(viii) The decision to remark is a prerogative of the School Examinations Committee. Remarking shall be completed

within two weeks. The new score awarded shall be approved by the Dean on behalf of the School's Academic Board;

(ix) If a student decides to withdraw his/her appeal before it is considered by the Committee, a notice of withdrawal shall be done in writing to make it valid;

(x) The School Board shall communicate its decisions to the Senate within a period of 14 days for ratification.

APPENDIX IV: Students' Examination Guidelines and Regulations

Examination constitutes a very important aspect of the University's activities. The University wishes to state categorically that the conduct of its examinations is taken seriously. Therefore the University will not condone any form of examination misconduct. Students are advised to abide by the following rule and guidelines:

1. A student's matriculation number serves as his/her examination number. Only Matriculates students will be allowed to sit for examinations. A student must write his/her matriculation number on his/her answer booklet before commencing answering the questions.

2. Students should normally write examinations at their designated centres.

3. Students must bring to the examination hall their writing materials and any other material, which may be permitted by the University for a particular examination. These materials must have been listed as essential for certain question(s).

4. Students arriving an hour after the commencement of an examination shall be allowed to sit for the examination only at the discretion of the Supervisor. Such a student will not be allowed at extra time.

5. Once a student is admitted into the examination hall, he/she may not leave the hall until he/she has finished with the examination. If for any cogent reason the student must leave the Hall, he/she must do so with the permission of the Supervisor.

6. A student must be accompanied by an invigilator if permitted to leave the examination hall temporarily (e. g. visiting the rest-room, etc)

7. No answer booklets other than those supplied by the University are allowed in the examination hall. All rough works must be done in the supplied answer booklets and crossed out neatly. All supplementary answer sheets/booklets must be tied/attached to the Main answer booklet.

8. Silence must be observed in the examination hall. Any student requiring the attention of the invigilator should raise his /her hand.

9. Any activity or behaviour which may be construed as examination misconduct or malpractice (e.g. cheating, etc.) shall be liable to discipline in accordance with the university's rules and regulations governing examination as contained in the Student Handbook.

10. Communication between students is strictly forbidden during examinations. Any student found receiving or giving assistance would be sanctioned. Such a student may be required to withdraw from the examination and subsequently made to face the university examination malpractice panel.

11. Students are not permitted to smoke or sing or pray aloud or engage in any activity that may distract others in the examination halls.

12. Bags and briefcases are not allowed in examination halls. The University will not be liable for any loss or damage of a student's personal effects/property.

13. Unauthorised materials (such as textbooks, course materials, notebooks, sheets/scraps of papers) in printed or electronic form are not allowed in examination halls.

14. Pagers and mobile phones are not permitted at all in examination halls.

15. Students must observe the Supervisor's instructions regarding the commencement and end of an examination. Students who start writing before being told to do so, or who continue writing after being asked to stop would be sanctioned.

APPENDIX V: Decree on Examination Malpractice

In order to check examination malpractices, a decree covering miscellaneous offences was promulgated in 1999. The main sections and points of the decree which every student should be familiar with are reproduced below. The information contained in this section is also provided in your hand book "Getting to know Your University". The *effort* at reproducing here some pertinent aspects of the decree is to demonstrate the seriousness the university has attached to Examination malpractice. Please do read it carefully.

All students of the National Open University of Nigeria are reminded that the University takes very seriously the conduct of its examinations and frowns seriously on any examination misconduct. The Decree is very relevant to you as a reminder of what could happen if you allowed yourself to be tempted to cheat in any form whatsoever during examinations. Note also that except you are under 17, for any examination misconduct, the decree does not give room for options of fine, the individual goes to jail. The University has however put in place series of quality assurance mechanisms to ensure the sanctity of her examinations, even including those ones you will take in your homes. In fact, the on-line examinations are easier to control than the face-to - face ones; when we get there you will see what· we mean.

Excerpts of very useful sections and points: (Source: EXAMINATION MALPRACTICES DECREE, 1999).

THE FEDERAL MILITARY GOVERNMENT
hereby decrees *iter alia* as follows:

PART 1 - OFFENCES

A person who, in anticipation of, before or at any Cheating at examination by any fraudulent trick or device or in abuse of his office or with intent to unjustly enrich himself or any other person procures any question paper produced or intended for use at any examination of persons, whether or not the question paper concerned is proved to be false, not genuine or not related to the examination in question; or by any false pretence or with intent to cheat or secure any unfair advantage for himself or any other person, procures from or induces any other person to deliver to himself or another person any question paper intended for use at any examination or by any false pretence or with intent to cheat or unjustly enrich himself or any person buys, sells, procures or otherwise deals with any question paper intended for use or represented as a genuine question paper in respect of any particular examination; or fraudulently or with intent to cheat or secure any unfair advantage for himself or any other person or in abuse of his office procures, sells, buys or other- wise deals with any question paper intended for the examination of persons at any examination.

An offence

A person guilty of an offence under subsection (1) of this section is liable on conviction.

(a) in the case of a person under the age of 18 years, to a fine of ₦100,000.00 or imprisonment;

(b) for term not exceeding 3 years or to both such fine and imprisonment;
in the case of a principal, teacher, an invigilator, supervisor, an examiner, or an agent or employee of the examination body concerned with the conduct of an examination, to imprisonment for a term of 4 years without the option of a fine; and

(c) in any other case, to imprisonment for a term of three years without the option of fine.

Where the person accused of the offence is an employee of an examination body concerned with the conduct of examinations or a head teacher, teacher or other person entrusted with the safety and security of question papers, he shall be proceeded against and punished as provided in this section, notwithstanding that the question paper concerned is proved not to be live, genuine or does not relate to the examination concerned.