DELTA STATE UNIVERSITY
ABRAKA, NIGERIA

DEPARTMENT OF SCIENCE EDUCATION
FACULTY OF EDUCATION

DEPARTMENTAL HANDBOOK

Name:_____

Matric. No:_____**Level**_____

Phone No:_____

Residential Address:_____

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Department of Science Education
2017/2018 Departmental Handbook

ISBN: 978-33872-6-9

First published by
Department of Business Education
Faculty of Education
Delta State University Abraka Nigeria

Printed by
PATOLA TECHNOLOGIES CO.
Shop B2 ABO Shopping Complex
Delta State University,
Site II, Abraka,
Delta State.
+2347055515215, +2348037477512

FORWARD

This information handbook is designed mainly for staff and students in the Department of Science Education, Delta State University, Abraka and all others who may be involved in operating the academic programmes of the department.

The content of handbook includes:

i. List of staff in the department
ii. History of the department
iii. Students admission and graduation policy
iv. Administration of the department
v. Conduct of examination
vi. Departmental list of excellence
vii. Programmes in the department, their course outlines and course description

The programme of the department leads to award of Bachelor of Science Education Degree (B.Sc Ed) in Biology, Chemistry, Physics, Mathematics, Integrated Science and Computer Science. A review of the structure and contents of this handbook may be necessary in future to reflect changes in the academic policies of the university and department in accordance with senate decisions.

I sincerely wish to advise all students of this department to carefully study the handbook and constantly refer to it as a guide throughout their stay in the department as students. It is my wish to use this forum to also advise all students to take their academic work with all seriousness and ensure that through diligence, hard work, honesty and brilliant performance contribute their quota towards creating a sound and enviable academic image of international status for the Department in particular and the faculty in general.

Finally, I wish to congratulate all the new students admitted into the Department of Science Education and wish all students of the department a very happy stay and successful academic pursuit in Delta State University.

Prof. Ajaja, Osawaru Patrick

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THE VISITOR, CHANCELLOR, PRO-CHANCELLOR AND PRINCIPAL OFFICERS OF THE UNIVERSITY

THE VISITOR
His Excellency, Sen. Dr. Ifeanyi Arthur Okowa
Executive Governor, Delta State of Nigeria

CHANCELLOR
Hon. Justice Godwin Adolphus Karibi-Whyte, JSC (Rtd)

PRO-CHANCELLOR
Prof. Sam Oyovbaire

VICE CHANCELLOR
Prof. Victor F. Peretomode
B.Ed (Benin), M.Sc. Ed., Ph.D, Post Doc. M.A. (Oklahoma)

DEPUTY VICE CHANCELLOR (ADMINISTRATION)
Prof. (Mrs.) Rose O. Aziza
B.A.(Ife), M.A. (Ibadan), PGDE (Benin), Ph.D (Ibadan)

DEPUTY VICE CHANCELLOR (ACADEMIC)
Prof. Austine E. Anigala
B.A (Calabar), M.A., Ph.D.(Ibadan)

PROVOST, ASABA CAMPUS
Prof. Samuel Asagba
B.Sc (Benin), M.Sc (Lagos), Ph.D (Benin)

PROVEST, OLEH CAMPUS
Prof. Stephen O. Emosairue
B.Sc (Calabar), M.Sc (Ibadan), Ph.D (Calabar)

REGISTRAR
Mr. Daniel A. Urhibo
B.Sc (Hons) Uniport, MIRL (Delsu), MANUPA, FICA, FIPND

BURSAR
Mr. Justice E. Egbare, FCA, MBA

UNIVERSITY LIBRARIAN
Prof. Stephen O. Uwaifo (*CLN*)
NCE (Abraka), BA.LS, MLS (BUK), Ph.D (Ibadan)

NOTES ON UNIVERSITY LOGO

(A) SHAPES INCORPORATED IN THE DESIGN

(i) The overall circular shape represents the cognate and holistic relationship of the constituent parts of the state.

(ii) The book represents academic knowledge and research.

(iii) The ornamental ivory tusks represent the culture upon which all knowledge must be predicated.

(iv) The derrick represents the mineral endowment of the state.

(v) The broken lines represent water which is a prime feature of the state.

(B) COLOURS INCORPORATED IN THE DESIGN

Three colours are incorporated in the University Logo. They are Sky Blue, Prussian Blue, and Black.

(i) Sky blue represents water which is found in abundance in the state.

(ii) Prussian blue is generally a colour for love which can lead to peaceful search for knowledge and truth.

(iii) Black represents the "black gold" (oil) which constitutes the bulk of the State's economy and prosperity.

MOTTO: Knowledge, Character, Service

FACULTY OF EDUCATION
DELTA STATE UNIVERSITY, ABRAKA
Dean
Professor E. P. Oghuvbu
B.Ed (Benin), M.Ed (Benin) Ph.D. (Abraka)

Associate Dean
Dr. (Mrs) F. N. Ugoji
B.Sc (Ibadan), M.Sc (Ibadan) Ph.D. (Abraka)

Ag HOD, Educational Admin. And Policy Studies
Dr (Mrs) N. Osakwe

Ag. HOD, Guidance and Counselling
Rev. Fr. Dr. J. Obiunu

HOD, Curriculum and Intergrated Science
Prof. P. O. Ajaja

Ag. HOD, Library and Information Science
Dr. M. O. Ogbomo

Ag. HOD, Human Kinetics & Health Education
Dr. O. E. Ochuko

Ag. HOD, Social Science Education
Dr. E. C. Ogheneakoke

Ag. HOD, Vocational Education
Dr (Mrs) N. Unuomah

HOD, Technical Education
Prof. K. Odu

A.g. HOD, Business Education
Dr. J. Okoro

DELTA STATE UNIVERSITY, ABRAKA
FACULTY OF EDUCATION
(DEAN'S OFFICE)
STAFF LIST

S/N	Name	Rank
1	Professor E. P. Oghuvbu	Dean
2	Mrs. Funke Aderonke Obarorakpor	Deputy Registrar
3	Mr. Efebe, Stephen	Senior Assistant Registrar
4	Dr. (Mrs.) Okonta, Vinella	Principal Personal Secretary
5	Mrs. Egheneji Blessing	Admin Assistant
6	Mrs. Merry Onororakpene Onoriasakpovwa	Higher Executive Officer
7	Obiora Christiana	Executive Officer
8	Miss. Emunotor, Felicia	Typist I
9	Utuoyo Austin	Senior Clerical Officer
10.	Miss Okiti Onojighofia	Head Messenger/ Cleaner
11	Mr. Edafe, Samuel	Senior Driver II

A BRIEF HISTORY OF THE UNIVERSITY

Delta State University Abraka, has been historically recorded as a Centre of Education. It started as a Government Teachers Training College during the colonial and some years into the post-colonial era. It became a College of Education that awarded National Certificate of Education (NC.E.) from 1971 to 1985. In 1981, it was affiliated to the University of Benin, Benin City and consequently offered degree programmes in 1985 when it became the Faculty of Education, of the then Bendel State University with its main campus in Ekpoma.

The creation of Edo and Delta States in August 1991 and the conversion of the main campus of the then Bendel State University Ekpoma to become Edo State University in December, 1991 necessitated the establishment of an autonomous Delta State University, Abraka on 30th April. 1992 by the Executive Governor of the State, Olorogun Felix O. Ibru. Hereunder is establishment of the law that proclaimed the University into existence.

"There is hereby established in Abraka University to be known as the Delta State University and; the Main campus of the University shall be sited in Abraka with a campus at Anwai, Asaba".

Delta State University, Abraka started with four Faculties;

- Faculty of Education
- Faculty of Arts
- Faculty of Sciences and
- Faculty of the Social Sciences

In 1995, the State Government introduced a policy of having three campuses that should be spread within the three senatorial districts in the State. In view of this policy three

campuses were established to include the main campus in Abraka, other two are in Oleh and Anwai Asaba. Consequen4 Academic programmes of the University are distributed as follows:

ABRAKA MAIN CAMPUS

- Faculty of Science
- Faculty of Education
- Faculty of Arts
- Faculty of the Social Sciences and
- College/Faculty of Basic Medical Science
- Pharmacy

ANWAI-ASABA CAMPUS

- Faculty of Agriculture
- Faculty of Management Sciences
- Faculty of Environmental Studies

OLEH CAMPUS

- Faculty of Law
- Faculty of Engineering

In Abraka, academic and other related activities are accommodated on three sites. The first which Is known as the site one today was developed to accommodate all the relevant activities that a Teacher's Training College needed. These included among others Academic. programmes: Administrative Buildings, Sports, Recreational Facilities and Accommodation for both staff and students. When the Teacher's Training College was upgraded to the status of College of Education, the volume of activities increased and the corresponding space requirements emerged. Based on this situation, site II was developed, In 1992, when the College of Education became a University, more facilities and land space posed a big challenge. This situation again necessitated

the development of site Ill that should accommodate all facilities and their space requirements. The site Ill is situated along Sapelel Agbor Road. It is being developed to accommodate all Academic programmes and all other support facilities and activities. They include:

- Faculty of the Social Sciences
- Faculty of Pharmacy
- Faculty of Education
- Faculty of Arts
- Faculty of Science
- Faculty of Basic Medical Sciences
- School of Postgraduate Studies Conference Centre
- Senate Building
- Stadium/Sports Centre
- Senior and Junior Staff Housing Complex
- Student Hostels (Male and Female)
- Pre-School, Primary and Secondary School Buildings
- Recreational Facilities (Staff Club, Zoological Garden, etc)
- Health Centre
- Other Service Units
- University Library, etc.

A BRIEF HISTORY OF THE FACULTY OF EDUCATION

The Faculty of Education, the oldest faculty in the university, started in 1985, when the University was still under Bendel State University, Abraka Campus. As at the Abraka Campus became a full fledge University (Delta State University, Abraka) in August 1992, Professor E.A. Arubayi became the pioneer Dean of the Faculty of education. Currently there are nine (9) Departments, namely:

1. Business Education
2. Educational Administration and Policy Studies
3. Guidance and Counselling
4. Human Kinetics and Health Education
5. Library and Information Science
6. Science Education
7. Social Science Education
8. Technical Education
9. Vocational Education

The following professors have functioned as Dean of the Faculty since its inception:

1. Professor E.A. Arubayi
2. Professor O.S. Okobiah
3. Professor G.C. Igbogbor
4. Professor Orona Oroka
5. Professor C.E. Mordi
6. Professor P.O. Ikoya
7. Professor E.P. Oghuvbu

Over the years, the faculty has witnessed phenomenal growth in terms of both student population and other academic programmes. The staff strength currently is over 100 academic staff.

NATIONAL ANTHEM

Arise O compatriots,
Nigeria's call obey,
To serve our fatherland
With love and-strength and faith
The labour of our heroes past
Shall never be in vain
To serve with heart and might
One nation bound in freedom
Peace and unity.

O God of creation,
Direct our noble course
Guide thou our leaden right
Help our youths the truth to know
In love and honesty to grow
And living just and true
Great lofty heights attain
To-build a nation
Where peace and justice shall reign

TEACHERS' REGISTRATION COUNCIL OF NIGERIA (TRCN)
ANTHEM

1. Oh! Teachers of Nigeria
   Oh! Teachers of Africa
   Teaching – Noble Profession
   Its Time for Transformation

   Its time to restore glory
   Leading the transformation
   Leading the restoration
   TRCN is here

2. The Giant of Africa
   The Pride of Nigeria
   In America and Asia
   In Far Away Europe

3. TRCN Resorates
   Teaching for Excellence
   Teaching – Noble Profession
   Oh Teachers, Your Triumph

DELTA STATE UNIVERSITY ANTHEM

Delta State University
The Founding of Our Fathers
Nurturing our Cherished Generations
A Vision to Harness the Past and Present
Projecting the Realities of Tomorrow
Beyond Gender, Race and Colour

Refrain
Great DELSU, Great Brains
Thrives in Hardwork for Self Reliance
Great in Knowledge, Character and Service

We Pledge to be Good Ambassadors
We Pledge to be Good Ambassadors

Oh Divine Giver of Wisdom
Guide our Focus and Determination
Of Excellence in All Human Endeavours
That through Knowledge Spread across
Faculties, We Rethink Human Kind for a New Universe
Where Freedom and Noble Values are Anchored

LIST OF STAFF

S/N	NAME	QUALIFICATIONS	POSITION
ACADEMIC STAFF			
1	Prof. Emmanuel A. Inomiesa	Ph.D (UNN) 1986, M.Ed (Philadelphia) 1980, B.Sc (Ed) (UNN) 1975	Professor
2	Prof. Emperor Kpangban	Ph.D Ibadan 2000, M.Ed (Manchester) 1986, B.Ed (Uniben) 1980, NCE (Abraka) 1974	Professor
3	Prof. Nnamdi S. Okoye	Ph.D (Ife) 1991, M.Ed (Ife) 1983, B.Sc (Ed) (Ife) 1979, OND (Enugu) 1974	Professor
4	Prof. O. Patrick Ajaja	Ph.D (Benin) 1998, M.Ed (Benin) 1990, PGDE Benin (1988), B.Sc (Port Harcourt) 1983	Professor
5	Dr. Timothy E. Agboghoroma	Ph.D (Abraka) 2005, M.Ed (Benin) 1994, B.Sc (Ed) (Ekpoma) 1987	Reader
6	Mr. Bethel I. Tabeta	M.Sc (Benin) 1994, B.Sc (Ed) (Ekpoma) 1990	Lecturer I
7	Dr. (Mrs.) Mercy O. Mokobia	Ph.D (Abraka) 2008, M.Ed (Delsu) 1998, B.Ed (Zaria) 1986, NCE (Zaria) 1981	Lecturer I
8	Dr. (Mrs.) Janice I. Iroriteraye-Adjekpovu	Ph.D (Port Harcourt) 2005, M.Ed (Port Harcourt) 1999, B.A (Ed) (Ekpoma) 1989 NCE (Warri) 1985	Lecturer I
9	Dr. Edarho O. Oyovwi	Ph.D (Abraka) 2013, M.Ed (Abraka) 2007, PGDE (Abraka) 2002, OND (Idah)	Lecturer I

		1987	
10	Dr. S.B. Ijeh	Ph.D 2012, M.Ed 2004, PGDSC (1998), B.Sc (Ed) 1992	Lecturer II
11	Mr. Isaac N. Kainti	M.Ed 2011, B.Sc (Ed) (Abraka) 2004, NCE (Warri) 1992, N.C.E, 1987	Asst. Lecturer
12	Mrs. Ogedegbe Hope	B.Sc (Abraka) 2007	Grad. Asst.
NON-TEACHING STAFF			
1	Joshua Bose	Diploma and B.Sc	Chief Typist
2	Onoriode Matthew	NCE	S.E.O
3	Miss Patience O. Ekpokpo	SSCE, 1994	Chief Clerical Officer
4	Miss Josephine Okotie	PSLC, 1974	Caretaker

HISTORY OF DEPARTMENT OF SCIENCE EDUCATION

The history of the Department can be traced to 1991/92 academic session when it was first called Department of Curriculum and Instruction. The present day Department of Social Science Education was once part of the Department of Science Education. In 1995/96 academic session, the department was renamed the Department of Teacher's Education (Science) after it was separated from the Department of Teachers Education (Social Science). The change in name of the Department still continued when in 2000/2001 session, the department was called the Department of Science Education. This name was highly treasured by both staff and students of the department.

The Department under this name, housed five Science Education which include: Biology Education, Chemistry Education, Mathematics Education, Physics Education, and Integrated Science. In 2006/2007 session the B.Sc(Ed) Computer Science Education programme was introduced into the Department. However, in 2010/2011 academic session, the Computer Science Education was relocated to Department of Technical and Business Education and the Department re-named Department of Curriculum and Integrated Science.

The frequent changes in the name of the Department have continued presently, the name of the Department is Department of Science Education with Computer Science Education restored to the department. The department now houses six programmes which include:

(a) B.Sc (Ed) Biology Education
(b) B.Sc (Ed) Chemistry Education
(c) B.Sc (Ed) Computer Science Education
(d) B.Sc (Ed) Integrated Science
(e) B.Sc (Ed) Mathematics Education
(f) B.Sc (Ed) Physics Education

Philosophy

The philosophy of Science Education in Delta State University is to produce suitable qualified manpower to teach Science and Mathematics in Secondary Schools. The era of Information Communication Technology (ICT) has broadened the scope to application of computer in the teaching of Science and Mathematics. The programme of Science Education is therefore structured to equip the students for effective performance of their duties in the instructional process and in classroom management. The students are to be exposed to the principles, practices and theories of teaching with special reference to Biology, Chemistry, Integrated Science, Mathematics and Computer Science.

Objectives

The main objectives of Science Education, Programme is to produce graduate teachers in Science and Mathematics with sound academic and professional training in Science Education.

Other specific objectives include to:

(a) Produce highly motivated concise and efficient classroom/laboratory teachers for our secondary school system.

(b) Train teachers who are conscious of the physical, culture and scientific progress of the country.

(c) Use the specialized training to give leadership in demonstrating theoretical and practical expertise in classroom and laboratory learning and

(d) Equip teachers both in physical and intellectual skills to enable them function in the society.

Vision and Mission Statements

Vision: Production of Science and Mathematics Teachers to compete favourably with their counterparts anywhere in the world.

Mission: To be able to achieve the above vision, the Department of Science Education, Faculty of Education, Delta State University, Abraka has to do the following.

- Teach courses as stated by the National Universities Commission (NUC) in the Minimum Academic Standard (MAS) for Nigerian Universities.
- Ensure that competent lecturers handle technical courses in the Department that require practical and skill acquisition works.
- Establish and develop a workshop studio that will use the modern equipment for teaching in the present age of Information and Communication Technology (ICT).
- Lecturers engage in research work for the up-dating of knowledge in sciences and Mathematics methods of instruction

STUDENT ADMISSION AND GRADUATION POLICY

i. **Admission, Retention and Graduation Policy**

Admission

A student is admitted through JAMB and must meet the cut-off of the Department determined by UAB. The students must have five credits in SSCE which must include English Language and Mathematics. The student is retained if he or she has a minimum CGPA of 1.00 in his 100 level and subsequent levels. Below CGPA of 1.5, the student is placed on probation or withdrawal. A student with CGPA below 1.0 in 100 level is withdrawn.

The student graduates when he/she passes minimum unit of 120 through UME and 90 through direct entry. Compulsory and required courses must be passed before graduation.

ii. **Probation, Expulsion, and Withdrawal**

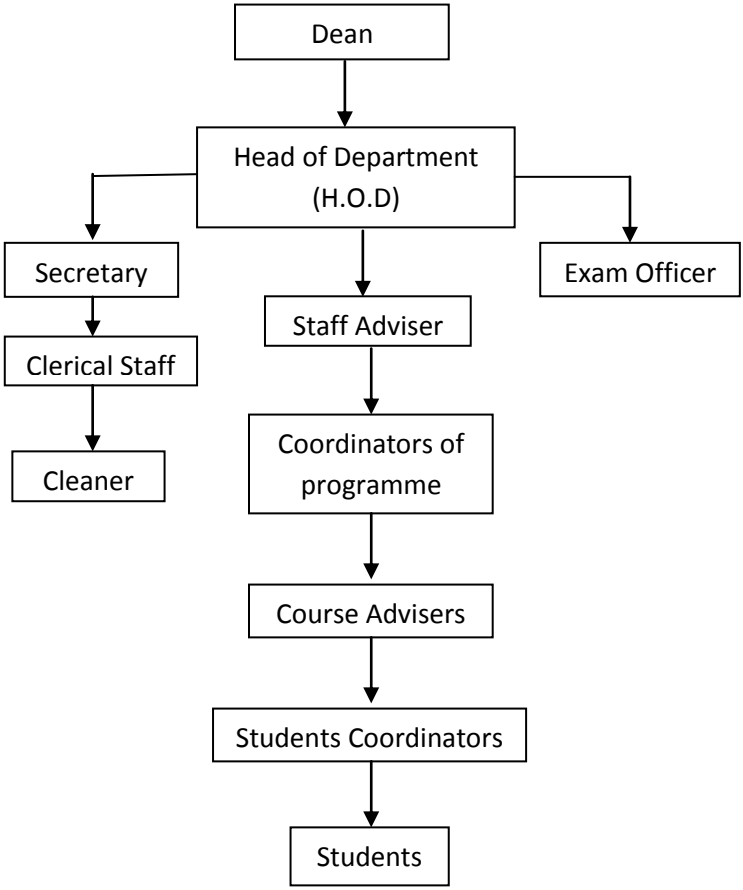
A student is on probation if she scores less than 1:50 CGPA. When the performance of the student fails to improve in the following year, he or she may be asked to withdraw. Students that are expelled are those involved in one criminal act or when the matriculation oath is violated.

Grading System and Requirements for Graduation

The CGPA is used for grading. It is total grade point divided by total units registered. The class of degree is obtained from the CGPA: 1st, 2nd class lower or upper and 3rd class. A student comes for extension for a session or a semester if he or she fails one or more compulsory course. He cannot graduate until he or she passes the course or courses.

ADMINISTRATION OF THE DEPARTMENT

i. **Personnel Administration**
ii. **Organization structure**



(a) Involvement of staff in decision-making process and in general administration:

In the Department Board of Studies, people make their views on the welfare of the Department known and issues from the various committees are deliberated upon. Results are also considered.

(b) Students' Welfare

(i) Handling of Academic Grievances

Students complaints are looked into immediately by the course advisers, student staff adviser, H.O.D., individual lecturers and the Department as the case may be.

(ii) Student Academic Advising

There are course advisers for each level who use previous results to advise students on the courses to register.

Examination

(a) Setting, conduct, evaluation schemes, moderation schemes internal and external for degree examinations and the issuance of results:

The setting of examination question is the responsibility of the course lecturer who submits to the Head of Department (HOD). The Department normally prepares Departmental examination time-table and invigilation roster for the conduct of the examination. The University has examination monitoring team that goes around monitoring examination and looking out for students engaging in examination malpractice. Students found wanting are sent to mobile court set up by the University for Disciplinary Measures.

After marking, the results are presented in the Departmental Board for consideration, before being sent to Faculty from where it is

further sent to Business Committee of Senate (BCS) and to Senate for final approval.

The questions, marking schemes, scores and booklets are moderated by an external examiner from another University. For year one to three, the results are pasted on the notice board and for final year students apart from passing it on the board, the results for the students are displayed during convocation when certificates are presented.

Departmental List of Excellence

A student who by virtue of his performance at the end of any academic semester achieves a G.P.A of 4.00 or over, will have his/her name published in the Department of Science Education list of excellence. Each list is valid for one semester immediately following the publication of results and until the publication of the results of the next semester. The names on the departmental list of excellence reflect not only the excellence performance of the students but also demonstrate academic capabilities of a high degree. Consequently such students maybe allowed to take extra courses beyond the normal course load.

BIOLOGY EDUCATION

(b) Programme/Sub-Discipline Philosophy and Objectives Philosophy

The philosophy of Biology Education which is a sub-set of philosophy of Science Education in Delta State University is to produce suitably qualified manpower to teach Biology in Secondary Schools, The era of Information Communication Technology (ICT) has broadened the scope to application of computer in the teaching of Biology The programme of Biology Education is therefore structured to equip the students for effective performance of their duties in the instructional process and in classroom management. The students are to be exposed to the principles, practices and theories of teaching with special reference to Biology.

Objectives

The main objective of Biology Education Programme is to produce graduate teachers in Biology with sound academic and professional training in Biology Education.

Specific objectives of the programme include to:

1. enable students to acquire the various concepts, principles, theories laws a conceptional schemes of Biology;
2. enable students to acquire necessary teaching and practical skills and or: aspects of methodology of teaching Biology;
3. help students to become effective classroom teachers;
4. expose students to industrial applications of Biology;
5. acquire the ethics of teaching as a profession:
6. become professional science teachers;
7. disseminate information in Biology education to the society;
8. develop necessary laboratory skills and;
9. develop positive values and attitudes for efficient discharge of the ii dui teachers.

c) Admission Requirements

(1). *UME Entry*

Candidates are expected to obtain SSC O'level with credit passes in at least subjects including English Language, Mathematics, Chemistry and Biology

(2). *DIRECT ENTRY*

Candidate must have at least merit passes in Biology at N. C.E and in either chemistry or geography.

.

(d) Programme Structure

The B.Sc(Ed,) degree programme has four-year and three-year duration for UME Direct Entry students respectively. The courses in 100, 200 and 300 level designed to equip the students with fundamental knowledge of science, Biology and skills in teaching. They also take general courses like GST and other elective courses from any of the teaching subject areas approved by the Department. At 400 level, in addition to Biology Education courses, students carry out research works (projects) on an approved topics. The project which is supervised by a lecturer Department, is also defended before a panel of lecturers in the Department.

B.Sc (Ed) Degree in Biology

100 Level –First semester

Course Code		Course Title	Units
EDU	100	Introduction to Teaching Profession	2C
EDU	102	Foundations of Education	2C
AEB	101	Principles of Animal Biology	3C
GST	101	Use of English and library	4C
GST	102	Logic, Philosophy and human existence	2C
CHM	101	General Chemistry I	3C
MTH	101	Elementary Mathematics I (Algebra and Trig)	3E
EDU	101	History of Education	2E
			21 units
			Total (core =16, Elective =5)

100 Level Second Semester

Corse Code		Course Title		Units
BOT	111	General Botany	3C	
CHM	111	General Chemistry II		3C
CHM	112	General Chemistry Laboratory	2C	
BIO	112	General Biology Laboratory		2C
GST	111	Nigerian People and Culture		2C
GST	112	History and Philosophy of Science		2C
GST	113	Peace Studies and Conflict Resolutions	2C	
SED	111	Science, Technology and Society		2C
EDU	114	Introduction to Language Education		2E
MTH	111	Elementary Mathematics III (Vectors)	3E	

23 units

Total (Core =20, Elective =5)

Grand Total **<u>44 Units</u>**

200 Level –First Semester

Course code		Course title	Units
EDU	200	Principles of Instruction	2C
EDU	201	Philosophy of Education	2C
EDU	202	Curriculum Theory and Development	2C
EDU	203	Micro teaching (Teaching Skill)	2C
AEB	201	Invertebrate Zoology	2C
BIO	204	Biological Techniques	2C
AEB	202	General Physiology I	2C
BOT	201	Seedless Plants	3C
CSC	200	Introduction to Computer	2C
MCB	202	Cell Growth and Development	2C
SED	204	History and Philosophy of Biology	2C

25 units

Total (Core =25)

200 Level –Second Semester

Course Code		Course Title	Units
EDU	211	Special Methods of Teaching	2C
EDU	212	Test and Measurement	2C
AEB	211	Chordates	2C
AEB	315	Evolution	3C
BIO	212	Introduction to Ecology	2C
BIO	213	Genetics I	3C
BOT	211	Seed Plant	2C
MCB	211	General Microbiology	3C
CES	211	Entrepreneurship and Innovation	2C
BIO	211	Biostatistics I	2E
SED	215	Science Education Method	2E

25 units

Total (Core =21, Elective =4)

Grand Total 50 Units

300 Level –First Semester

Course Code		Course Title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration and Planning	2C
EDU	302	Educational Technology	2C
AEB	302	Comparative Animal Physiology	3C
AEB	303	General Ecology	3C
BCH	201	General Biochemistry I	2C
BIO	301	Genetics II	2C
BOT	303	Plant Physiology I	3C
EDU	305	Educational Statistics	2E
SED	303	Environment and Population	3E

25 units

Total (Core =20, Elective =5)

300 Level Second Semester

Course	Code	Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Method and Data Processing	2C
EDU	313	ICT in Education	2C
AEB	313	Parasitology	3C
AEB	314	Principles of Development (Comparative vertebrate Embryology)	3C
BCH	211	General Biochemistry II	2C
BOT	311	Plant Ecology 1	3C
SED	312	School science Laboratory	2C
CES	311	Entrepreneurship Studies (Business Creation and Growth)	2C
SED	318	Curriculum Implementation and Evaluation	2E

23 units

Total (Core =21, elective =2)

Grand Total **48 Units**

400 Level –First Semester

Course	Code	Course Title	Units
EDU	401	Teaching Practice	3C
EDU	402	Guidance and Counseling	2C
EDU	404	School Administration and the Law	2C
AEB	403	Entomology	3C
BOT	402	Plant Reproduction	2C
BOT	406	Soil Science	2C
SED	407	Seminar	2C
EDU	406	Curriculum Innovation and Revision	2E
BOT	404	Economic Botany	3E

21 units

Total (Core =16, Elective =5)

400 Level-Second Semester

Course Code		Course Title	Units
EDU	410	Research project	6C
EDU	411	Special Education	2C
AEB	414	Hydrobiology and Fishery	3C
BOT	412	Plant Pathology	2C
BOT	414	Plant Tissues	2C
BIO	411	Conservation and Biodiversity	2C
AEB	411	Animal Behaviour	3E

20 units

Total (core =17, Elective =3)

Grand Total 41 Units

Old

300 Level –First Semester

Course Code		Course Title	Units
AEB	301	Comparative Vertebrate Anatomy	3E
AEB	302	Comparative Animal Physiology	3C
AEB	303	Animal Ecology	3C
BCH	201	General Biochemistry	3C
BIO	301	Genetics II	2C
BOT	301	Taxonomy of Flowering Plants	3E
BOT	303	Whole plant Physiology	3C
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration & Planning	2C
EDU	302	Educational Technology	2C
EDU	303	Childhood Education	2E
EDU	304	Rural Education	2E
EDU	305	Educational Statistics	2E
SED	312	School science Laboratory	2E

35 Units

Total (Core =21, Elective =14)

300 Level Second Semester

Course	Code	Course Title	Units
AEB	311	Basic Entomology	3C
AEB	312	Introductory Hydrobiology	3C
AEB	313	Introductory Parasitology	3C
BCH	211	General Biochemistry II	3C
BOT	311	Plant Ecology 1	3C
BOT	312	Metabolic Plant Physiology	3E
EDU	311	Educational Psychology	2C
EDU	312	Research Method /Data Processing	2C
EDU	313	ICT in Education	2E
EDU	314	Emergent Problems in Nigeria Education	2E
EDU	315	Introduction to Economics Education	2E
SED	317	ICT in Education	2C
SED	318	Curriculum Implementation and Evaluation	2E
CES	311	Business Creation and Growth	0C

32 Units

Total (Core =21, elective =11)

400 Level –First Semester

Course	Code	Course Title	Units
AEB	403	Nigeria Fauna	3C
AEB	404	Applied Entomology	3E
AEB	405	Parasitology	2C
AEB	406	Hydrobiology	3C
BOT	404	Economic Botany	3E
BOT	406	Soil Science	3C
EDU	401	Teaching Practice	3C
EDU	402	Guidance and Counseling	2C
EDU	403	Continuous Assessment	2E
EDU	404	Education Law	2E
EDU	405	Sociological Theory	2E
EDU	406	Curriculum Innovation and Revision	2E

SED	407	Research Seminar	2C

32 Units

Total (core =18, Elective =14)

400 Level-Second Semester

Course Code		Course Title	Units
AEB	411	Animal Behaviour	3E
AEB	417	Environmental Physiology	3C
BOT	411	Plant Ecology II	2E
BOT	412	Plant Pathogy	3C
BIO	411	Conservation and management of natural resources	2C
EDU	410	Research project	4C
EDU	411	Organization and Administration of Prim. And Sec. Education	2C
EDU	412	Comparative Education	2C
EDU	413	Adolescent Psychology	2E

23 Units

Total (core =16, Elective =7)

BIOLOGY COURSE DESCRIPTION

AEB 101 - Principles of Animal Biology- 3C

Introduction to Zoology as a discipline. Macromolecular basis of life, cellular basis of biological organisation, cell structure and functions, energy production and utilization, distribution of genetic material mitosis and meiosis, inheritance and variation, general reproduction and growth, organic evolution, the organism and its environment. Practicals inclusive.

AEB 201 - Invertebrate Zoology- 2C

A general study of the classification, structure, function, evolution and phylogenetic relationships, adaptive radiation of the lower invertebrates Free Living Protozoans, Porifera, Cnidaria, Ctenophora, Platyheirninthes Aschelminthes and Nemertea. Co-requisite AEB 202

AEB 203 - Systematic Zoology (2 Units)

Zoological Classification- the species category, polytipic species, population systematic, inter-specific categories, higher categories.

BIO 204: Biological Techniques – 2C

Basic research techniques in Animal and Environmental Biology including microtechniques, microphotography, biological illustrations. Histological and physiological techniques. Hydrobiological and entomological techniques. Taxidermy and preparation of skeleton and other teaching aids.

AEB 204- General Physiology I- 2C

Physical and chemical processes in animal physiology. The principles of physiology as illustrated by cells, tissues, organs and whole organisms. Functional relationship of different organs and systems in vertebrates. Metabolic processes, coordination and control of metabolism.

AEB 211 – Chordates – 2C
A general stud the classification, structure function, evolution and phylogenetic relationship, adaptive radiation and palaeontology of protochordates and fishes.
Co-requisite AEB 212

BIO 212 – Introduction to Ecology- 2C
The ecosystem approach to the study of ecology flow and nutrient cycling of populations and communities in the ecosystem; influence of man. Productivity in an aquatic and terrestrial ecosystem. Food chains and trophic level.

BIO213 –Genetics I- 3C
Heritable and non-heritable characteristics. Principle government transmission of hereditary factors from parent to off springs and population. Quantitative inheritance. Variation in gene structure Sex determination. Introduction to population genetics.

AEB 302- Comparative Animal Physiology- 3C
A general and comparative study of animal physiological principle including nutrition and digestion, homeostasis and ionic/osmotic regulation, excretion, respiration, reproduction and blood circulation. Biophysics of excitable membranes. Control and co ordination of body functions by nervous and endocrine systems. Pre-requisite AEB 205.

AEB 303- General Ecology- 3C
Animal populations and communities in the regulation of numbers; interrelationships, of biotic and environmental factor that control population responses and interaction. The ecology of local terrestrial and aquatic animals. Pre-requisite BIO 212.

AEB 403: Basic Entomology- 3C

A general study of insects, their evolution, classification distribution and relationships to other arthropods. Genera! structure and function of insects part with special reference to the exoskeleton, body segmentation and appendages (including moth parts). Digestive, Respiratory, Excretory circulatory and Nervous systems. life cycles of selected representatives of the insects. Reproductive organs, types of reproduction; including larval and pupa forms. Behaviour and ecology of social insects.

Pre-requisite AEB 202.

AEB 414: Hydrobiology and Fishery- 3C

Types of aquatic habitats. The physical properties of water, water movement and dissolved substance in natural water, their relation to the structure, functioning and community composition of aquatic ecosystems. Basic treatment of immunochemical methods. EPA standard requirements. Water quality criteria. The ecology of plankton and aquatic macrophytes. Primary production and structure of food weds in aquatic ecosystems. Practical study of the characteristic communities of the following habitats; a forest stream, a large river, riverine swamp forest pools, a man-made pond, mangrove creek and puddles.

AEB 403: Nigerian Fauna (2 Units)

General survey of local molluscs, arthropods, and vertebrates, and collections and preservations of local examples.

AEB 404: Applied Entomology (3 Units)

Principles of applied entomology, taxonomy, epidemiology and physiological effects on hosts of the major insect-pests and Acari of agricultural, medical and veterinary importance in West Africa. Management and control of pests of crops, livestock, and stored products: Collection, preservation of various insect groups. Competition, population dynamic, swarming and pest outbreaks among insects and the Acari.

Pre-requisite AEB 3 II.

AEB 411 - Animal Behaviour- 3C
A general survey of animal behaviour as a function of nervous complexity. The development of animal behaviour orientation instinct and learning. Behaviour patterns in animals. Territorial reproductive behaviour and social life in animals. Effect of hormone behaviour.

BOT 111: General Botany II – 3C
The general morphology anatomy, histology and physiology of flowering plants; seed structure, dispersal and germination; development of primary and secondary plant body; water relations, photosynthesis, translocation and storage organs; respiration.

BOT 201 Seedless Plants- 3C
A systematic, evolutionary and phylogenetic treatment of the Fungi; Algae; Bryophytes; and Pteridophytes with reference to their ecology importance to man; treatment should include general structure life cycles of the groups.

BOT 211: Seed Plants (Higher Plant Groups)- 2C
A survey of the evolution, morphology, ecology and economic importance of gymnosperms; a study of the major types of development of the embryo in gymnosperms and angiosperms, (flowering plants), classification of gymnosperms and angiosperms, life in named examples of gymnosperms; description of flowers in angiosperms; fertilization and fruit formation in angiosperms, classification of fruits.

BIO 212: Introduction to Ecology- 2C
The ecosystem approach to the study of ecology; flow and nutrient cycling of populations and communities in the ecosystem; food chains and food webs, and trophic levels; interactions between plants and animals, influence of man; productivity in aquatic and

terrestrial ecosystems; ecological groups; hydrophytes, halophytes, xerophytes, epihytes, aerophytes and mesophytes.

BIO 213: Genetics I- 2C
Heritable and non-heritable characteristics; principles governing the transmission of hereditary factors from parents to offspring, and in a population; quantitative inheritance variation in genome structure; determination; introduction to population genetics.

BOT 301: Taxonomy of Flowering Plants- 3C
Floral morphology and evolution of floral structures, principles and practice of flowering plant taxonomy, with emphasis on the phylogenetic relationship and evolutionary features in classification; detailed study of selected, locally important families; identification keys; herbarium techniques.
(It is compulsory for students to submit a collection of at least fifty, well pressed and mounted herbarium specimens from various families as part of the course examination).
(Pre-requisite BOT211)

BOT 303: Plant Physiology- 3C
Principles of cell water relations: Plant water relations, including the importance of environmental factors. Properties of water in relation Processes in the living plants. Morphological adaptations the water status of the habitat. Water uptake and movement. The ascent of sap. Mineral nutrition: Mechanism of nutrient uptake and translocation. Role of macro and micronutrient elements. Ion deficiency symptoms.

BIO 301: Genetics II - 2C
Aspect of ,human genetics, pedigrees analysis, polyploidy, chromosomal mutations and aberrations, further consideration of various deviations from basic principles; gene concept, gene interaction and mutation, polygenic inheritance; population

genetics; consideration of mathematical models for the analysis of gene frequencies, and genetic variation in populations.

BOT 311: Plant Ecology I- 3C
Studies of various plant communities and their ecological framework; Nigerian vegetation; desert and semi-desert; plant productivity; modem concept of ecology.
Pre-requisite BIO 211

BOT 312: Metabolic Plant Physiology- 3C
Photosynthesis: CO_2 as a gaseous nutrient. The photosynthetic apparatus and light absorption, fundamental nature of light as absorbable energy, Carbon pathways including the Calvin cycle, C C and CAM (Crassulacean Acid Metabolism) pathways. Photosynthesis and chemosynthesis in microorganisms. Trans1ocation: Pathways and mechanisms of the process, hypotheses. Respiration: Glycolysis and anaerobic pathway, Krebs cycle. Pentose shunt, respiratory enzymes. Measurement o (respiration rates. Nitrogen metabolism: N cycle. Symbiotic and non-symbiotic nitrogen fixation. Amino acid formation. Amides proteins, alkaloids. Pre-requisite BOT 303

BOT 404: Economic Botany- 3E
The origin, history, sources, taxonomy, morphology, ecology and uses of the economic plants of West Africa. A Few examples which may vary from year to year are to be chosen from serving various purposes e.g. food, fibre, medicine, timber, cereals, forage, essential oils and perfumes beverages, etc.

BOT 311: Plant Ecology II- 3C
Description and classification of vegetation, types of vegetation in West Africa; Nigerian vegetation; desert and semi-desert; plant productivity; quantitative method for the study of vegetation, vegetation dynamics; autecology, syneology; (course to include a short autecology project).

Effects of physical environment on plants; climatic, biotic and topographic factors. Pre-requisite BOT 311, BOT 406.

B0T 412: Plant Pathology – 2C

Techniques of plant pathology, principles and practice of plant pathology: plant infection, agents of disease, types of plant disease, nematodes, diagnostic. features and recognition of plant diseases; plant disease control, quarantine practices, breeding for resistance; structure and action of fungicides, resistance mechanisms, pre-and post harvest disease of economically important crops; host-parasite relationship, diseases of major economic crops of Nigeria and the world, and their control.

CHEMISTRY EDUCATION

(b) Programme/Sub-Discipline Philosophy and Objectives Philosophy

The philosophy of Chemistry Education which is a sub-set of philosophy of Science Education in Delta State University is to produce suitably qualified manpower to teach Chemistry in Secondary Schools, The era of Information Communication Technology (ICT) has broadened the scope to application of computer in the teaching of Chemistry. The programme of Chemistry Education is therefore structured to equip the students for effective performance of their duties in the instructional process and in classroom management. The students are to be exposed to the principles, practices and theories of teaching with special reference Chemistry.

(i) Objectives

The main objective of Chemistry Education Programme is to produce graduate teachers in Chemistry with sound academic and professional training in Chemistry Education. Specific objectives of the programme include to:

1. enable students to acquire the various concepts, principles, theories, laws and conceptional schemes of Chemistry.
2. enable students to acquire necessary teaching and practical skills and other aspects of methodology of teaching chemistry;
3. help students to industrial applications of Chemistry;
4. expose students to become effective classroom teachers;
5. acquire the ethnics of teaching as a profession;
6. become professional science teachers;
7. disseminate information in Chemistry Education to the society;
8. develop necessary laboratory skills and;
9. develop positive values and attitudes for the efficient discharge of their duty as teachers.

(ii) Admission Requirements

(1) UME Entry

Candidates are expected to obtain SSC O' level with credit passes in at least five subjects including English Language, Mathematics and Chemistry.

(2) DIRECT ENTRY

Candidate must have at least merit passes in Chemistry at N.C.E and Education or any other subject, or GCE 'A' level passes including Chemistry.

(iii) Programme Structure

The B.Sc (Ed) degree programme has four-year and three-year duration for UME and Direct Entry students respectively. The courses in 100, 200 and 300 levels are designed to equip the students with fundamental knowledge of science, Chemistry and skills in teaching. They also take general courses like GST and other elective courses from any of the teaching subject areas approved by the Department. At 400 level, in addition to Chemistry Education courses, students carry out research works (projects) on an approved topics. The project which is supervised by a lecturer in the Department is also defended before a panel of lecturers in the Department.

B.Sc (Ed) Degree in Chemistry

100 Level -First Semester Courses

Course Code		Course title	Unit
EDU	100	Introduction to Teaching Profession	2C
EDU	101	Foundations of Education	2C
CHM	101	General Chemistry I	3C
GST	101	Use of English and Library	4C
GST	102	Logic, Philosophy and Human Existence	2C
MTH	101	General Mathematics I	3E
AEB	101	Principles of Animal Biology	3E
			19 units
			Total (Cores =13, Electives =6)

100 Level -Second Semester Courses

Course code		Course Title	Units
CHM	111	General Chemistry II	3C
CHM	112	General Chemistry Laboratory	2C
GST	111	Nigeria, Peoples and Culture	2C
GST	112	History and Philosophy of Science	2C
GST	113	Peace Studies and Conflict Resolution	2C
SED	111	Science Technology and Society	2C
BOT	111	General Botany	3E
EDU	114	Introduction to Language Education	2E
			18 units
			Total (Cores =13, Elective =5)
			Grand Total **<u>37 Units</u>**

200 Level –First Semester Courses

Course Code		Course Title	Units
EDU	200	Principles of Instruction	2C
EDU	202	Curriculum Theory and Development	2C
EDU	203	Micro Teaching (Teaching Skills)	2C
EDU	201	Philosophy of Education	2C
CSC	200	Introduction to Computer	2C
CHM	201	Physical Chemistry I	2C
CHM	202	Inorganic Chemistry II	2C
CHM	203	Organic Chemistry	3C
SED	204	History and Philosophy of Chemistry	2C
MTH	202	Linear Algebra I	3E
			22 units
			Total (cores =19, Electives =3)

200 Level –Second –semester Courses

Course code		Course title	Units
EDU	211	Special Methods	2C
EDU	212	Test and Measurement	2C
CHM	211	Analytical Chemistry I	3C
CH M	212	Structures and Bonding	2C
CHM	204	Chemistry Practical	2C
CES	211	Entrepreneurship and Innovation	2C
MTH	212	Linear Algebra II	3E
PHY	212	Energy and Environment	2E
SED	215	Science Education Methods	2E
SED	213	Industrial Process	3E
			23 units
			Total (Cores =13, Elective =10)
			Grand Total **45 Units**

300 Level -First Semester Courses

Course code		Course title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration and Planning	2C
EDU	302	Educational Technology	2C
CHM	301	Physical Chemistry II	3C
CHM	302	Inorganic Chemistry III	3C
CHM	303	Organic Chemistry II	3C
CHM	304	Instrumental Method of Analysis	3C
CHM	306	Organometallic Chemistry	2C
CHM	307	Natural Product Carbohydrate Chemistry	2C
EDU	303	Childhood Education	2E
EDU	305	Educational Statistics	2E

27 units

Total (Core =23, Electives =4)

300 Level Second Semester Courses

Course Code		Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Methodology & Data Processing	2C
EDU	313	ICT in Education	2C
CES	311	Entrepreneurship Studies (Business Creation and Growth)	2C
CHM	311	Atomic, Molecular Structure & Symmetry	2C
CHM	312	Practical Chemistry	2C
CHM	315	Polymer Chemistry	2C
CHM	316	Environmental Chemistry	2C
CHM	314	Applied Spectroscopy	2E
SED	311	School Science Laboratory	2E

20 units

Total (Cores =16, Electives =4)

Grand Total 47 Units

400 Level -First Semester Courses

Course Code		Course Title	Units
EDU	401	Practical Teaching	3C
EDU	402	Guidance and Counseling	2C
EDU	404	Educational Administration and Law	2C
SED	407	Seminar	2C
CHM	402	Reaction Kinetics	2C
CHM	403	Electrochemistry	2C
CHM	404	Radio-Nuclear Chemistry	2C
CHM	405	Analytical Chemistry II	2C
CHM	407	Organic Synthesis	2C
EDU	403	Continuous Assessment	2E
			21 units
		Total (Cores =19, Elective =2)	

Second Semester Courses

Course Code		Course Title	Units
EDU	410	Research Project	6C
EDU	411	Special Education	2C
CHM	415	Coordination Chemistry	2C
CHM	417	Chemistry of Lanthanides /Actinides/Non-Aqueous Solvents	2C
CHM	419	Industrial Chemistry Process	2C
EDU	413	Adolescent Psychology	2E
SED	412	Cycles in Nature	3E

19 units

Total (Cores =14, Elective =5)

Grand Total **<u>40 Units</u>**

Old

300 Level -First Semester Courses

Course code		Course title	Units
CHM	301	Physical Chemistry III	3E
CHM	302	Inorganic Chemistry III	3C
CHM	303	Organic Chemistry III	3C
CHM	304	Practical Organic /Physical Chemistry	2C
CHM	306	Organic Metallic Chemistry	2C
CHM	307	Carbohydrate Chemistry	2C
EDU	300	Teaching Practice	3C
EDU	301	Education Administration	2C
EDU	302	Introduction to Educational Technology & Planning	2C
EDU	303	Childhood Education	2E
EDU	304	Rural Education	2E
EDU	305	Educational Statistics	2E
			28 Units
			Total (Core =19, Electives =9)

300 Level Second Semester Courses

Course Code		Course Title	Units
CHM	311	Atomic, Molecular Structure & Symmetry	2C
CHM	312	Instrumental Methods of Analysis	3C
CHM	314	Applied Spectroscopy	2C
CHM	315	Polymer Chemistry	2C
CHM	316	Environmental Chemistry	2C
EDU	311	Educational Psychology	2C
EDU	312	Research Methodology & Data Processing	2C
EDU	313	Ict in Education	2E
EDU	314	Emergent Problems in Nigeria Education	2E
EDU	315	Introduction to Economic Education	2E
SED	318	Curriculum Implementation And Evaluation	2E

SED	317	Ict in Science Education	2C
SED	312	School Science Laboratory	2E
CES	311	Business Creation and Growth	0C

27 Units

Total (Cores =17, Electives =10)

400 Level -First Semester Courses

Course Code		Course Title	Units
CHM	401	Theory of Molecular Spectroscopy	2E
CHM	402	Reaction Kinetics	2C
CHM	404	Nuclear and Radio Chemistry	2C
CHM	405	Analytical Chemistry II	2C
CHM	407	Organic Synthesis	2C
EDU	401	Practical Teaching	3C
EDU	402	Introduction to Guidance and Counseling	2C
EDU	403	Continuous Assessment	2E
EDU	404	Education Law	2E
EDU	405	Sociological Theory	2E
EDU	406	Curriculum Innovation and Revision	2E
EDU	407	Seminar	2C

25 Units

Total (Cores =15, Elective =10)

Second Semester Courses

Course Code		Course Title	Units
CHM	415	Coordination Chemistry	2C
CHM	417	Chemistry of Lanthanides /Actinides	2C
CHM	419	Industrial Chemistry Process	2C
CHM	423	Statistical Dynamics	2C
EDU	410	Research Project	4C
EDU	411	Organization And Administration of Primary And Secondary Education	2C

EDU	412	Comparative Education	2C
EDU	413	Adolescent Psychology	2E

18 Units

Total (Cores =16, Electives =2)

CHEMISTRY

CHM 101: GENERAL CHEMISTRY – 3C

Atoms, molecules, atomic structure and the development of the atomic theory, the nucleus, electronic configuration, chemical bonding; electrovalent compounds. Covalent compounds, the dative covalent bond, factors limiting velectrovalency, chemical equations and stoichiometry radioactivity, properties of gases, equilibria and thermodynamics chemical kinetic basic electrochemistry.

CHM 112: GENERAL CHEMISTRY LABORATORY -2C

Acid –base titration, Redox titration, synthesis and preparation of inorganic compounds, analysis of selected anions and cations, Preparation and qualitative analysis of organic compounds; Pl I measurement.45 (p)

CHM 111: GENERAL CHEMISTRY II – 3C

Periodic classification of elements, the periodic table, groups and periods, relationship in the table of main group elements, the periodic law ,anomalics in the periodic table. Valence forces, structure of solids. Chemistry of selected metals and non –metals. Organic chemistry; definition, history, classification, of organic compounds, nomenclature, homologous series, functional group (e.g. alkane, alkynes, alcohols, sulphoxsides and sulphones): basic stereochemistry electronic theory in organic chemistry, saturated hydrocarbons, unsaturated hydrocarbons, importance of organic chemistry.

CHM 201: PHYSICAL CHEMISTRY I- 2C

Maxwell distribution law of molecular velocities. Equation of Boyle's law, Charles 'law, Van der Waals equation. Calusius equation, etc. Mean free path, transport properties of gases, rate laws, calculations of molecular diameter from viscosity and diffusion data. The principles of equipartition of energy. Effect of temperature on reaction rates, the Arrhenius equation. The laws of thermodynamics, entropy and free energy, reaction and phase equilibra. Introduction to photochemical reactions.

Pre –requisite CHM 101, CHM 111, 30h (I)

CHM 202: INORGANIC CHEMISTRY II – 2C

Chemistry of first transition metals, basic co –ordination chemistry including elementary treatment of crystal field theory, comparative chemistry of the the following elements:

(a)Ga, In, Ti (b) Ge, Sn, Pb (c) As, Sb, Bi (d) Sc, Tc, Po, Elementary introduction of organometalic chemistry, significance of metals in biochemical systems.

Pre –requisite CHM 111 3Oh (T)

CHM 203: ORGANIC CHEMISTRY -3C

Factors affecting structure and physical properties of organic compounds, Factors affecting directional movement of electrons in organic reactions, energy of activation, entropy of activation, transition theory and enthalpy diagrams, free radical substitution reaction in alkanols, functional group of chemistry, electrophile and nucleophilic organic reactions, addition, elimination, substitution(displacement), oxidation, reduction, rearrangement, stereochemistry.

Pre –requisite CHM 111 30(T)

CHM 204: CHEMISTRY PRACTICAL II – 2C

The laboratory course of a group of experiments drawn from physical, inorganic, organic and analytical chemistry.

Pre –requisite CHM 112 45(P).

CHM 211: ANALYTICAL CHEMISTRY I – 2C

Theory of errors, accuracy, precision, mean deviation, standard deviation, statistical methods in analysis, theory of sampling, concept of precipitate formation contaminations, quality of good analytical precipitate calculation in gravimetry, titrimetry, acid base, redox, precipitation titration, complexometric titration. Indicators for acid –base titration, complexometric titration, redox titration etc. Chemical methods analysis, methods of separation.

Pre –requisite CHM 101 and CHM 111 30h

CHM 212 – STRUCTURE AND BONDING – 2C

Ideal of quantum states, orbitals, shapes and energy. Simple valence theory, electron pair repulsion theory, atomic spectra, determination of molecular shape, bond lengths and angles. The structure and chemistry of some compounds of main group elements.

Pre –requisite CHM 101 and CHM 111 30(I)

CHM 301: PHYSICAL CHEMISTRY II – 3C

Chemical thermodynamics, revision of 1^{st} law of thermodynamics, Heat of combination. Variation of heat of reaction with temperature. The second law of thermodynamics, the Gibbs helmbolts equation and its application. Maxwell relations and their applications in thermodynamics. Statistical thermodynamics, energy states and levels, micro states and macro states. Thermodynamics probability. The Bose –Einstein statistics and distribution. The Maxwell Botzman statistics and distribution. The partition functions. The statistical interpretation of entropy. Non -ideal solutions, properties of electrolytes.

Pre –requisite CHM 201, OR CHM 202, 203, 204 45h (T)

CHM 302: INORGANIC CHEMISTRY II – 3C

The noble gases: hydrogen, electronic structure, general properties and comparative study of group 1A and group 11A elements. Chemistry of boron, carbon and silicon, nitrogen and phosphorus,

oxygen and sulphur, the halogens. Transition elements, separation of metals, co –ordination chemistry, ligands and crystal field theories, introductory radiochemistry, radioactivity and the periodic table.
Pre –requisite CHM 202 45 H (T)

CHM 303: ORGANIC CHEMISTRY II – 3C
Alcohols, nomenclature, preparation reactions, ether and carboxides, esters, carboxylic acids, nomenclature, preparation, derivatives. Aldehydes and ketones; nomenclature, preparation, chemical properties, classification of organic compound, aromatic and alicyclic chemistry, poly –functional compounds, hetro -cyclic chemistry.

CHM 304: INSTRUMENTAL METHOD OF ANALYSIS - 2C

(a) Organic chemistry practical's

Physical examinations of samples. Elementary analysis to detect elements other than H and O. Solution solubility, classification and functional group test. Preparation of derivatives. Benzophenone by acylation of benzene, P –bromoacetanilide, benzanilide by benzoylation of aniline, 2 -4 dichlorophenoxyacetic acid, M –nitroaniline, M –nitrophenol, D –bromophentane(amylbromide) from pentan -1 -01 (amylalcohol).

(b) PHYSICAL CHEMISTRY PRATICALS

Conductance of electrolyte solutions. Thermodynamics chemistry -Heat of solution, acid, neutralization, viscosity measurement. Calorimetry determination of the percentage manganese in steel sample. Determination of standard thermodynamics quantities for a reaction. Phaserule two component solid –liquid system, phase diagram of naphthalene and Naphthol; Potentiometric Titration Inorganic preparations. Preparation of Ben amine –cobalt III chloride.

Determination of the fonnular and solubility constant of the silver ammonia complex.

(c) INSDUSTRIAL CHEMISTRY PRACTICALS

Food, analysis, processing polymer science practical, Fastness properties of locally available dyes. Practical in extraction metallurgy, Practical in extraction metallurgy, Pre-requisite CHM204 45h (P)

CHM 306: ORGANOMETALIC CHEMISTRY I – 2C

Classification of organometalic compounds: preparation, structure and variation of organometalic compound, use of organometalic compound in synthesis, organoboron compounds and organozinc compound. Generation and detection of free radicals from organometallic compounds. Pre-requisite CHM20330h (T)

CHM 307: NATURAL PRODUCT CARBOHYDRATE CHEMISTRY-2C

Classification, structure and nomenclature. Chemical properties of mono-sacharides oxidation, reaction in base, reduction Ruff degration, kiliani-Fischer synthesis, Osazone formation, configuration, epimerization.
Pre-requisite CHM20330 h (T)

CHM 311: ATOMIC, MOLECULAR, STRUCTURE AND SYMMETRY -2C

Schrodinger equation, Helium atom, ground and excited states, spin, Paul exclusion principle, Helium rule, Hydrogen molecule, comparison of molecular orbital and valence bond theory, concept of resonance and configuration interaction. Coulson Fischer function, molecular orbital for diatomic molecules, single Pi electron theory, Iiuckel theory Walsh rules, Rotational, vibrational and electronic spectra. Determination of bond length and angles, Russel socuders coupling orbites and spin angular momentum, use of symmetry in chemistry.
Pre –requisite CHM 212 30 h (T).

CHM 312: PRACTICAL CHEMISTRY- 2C

Spectroscopic techniques, ultraviolet and visible methods; Quantitative analysis, infrared spectro –photometry, Raman spectroscopy, Quantitative analysis; X-ray methods, fluorescence methods, nuclear magnetic resonance and electron spin resonance spectroscopy, refractometry and interferometery polarimetry, calorimetry. 45 h (T)

CHM 314: APPLIED SPECTROSCOPY – 2E

The course is weighted heavily on the application of various spectroscopic techniques e.g UV, IR, NMR, and mass spectroscopy for structural elucidation of predominantly organic compounds. 45 h (T)

CHM 315: POLYMER CHEMISTRY – 2C

Polymer meaning and nomenclature, formation of polymers, chain reaction polymerization and step reaction polymerization; source of raw materials for polymer. Polymerization process, condensation.

CHM 316: ENVIRONMENTAL CHEMISTRY – 2C

Concept of elementary cycles. Characteristics of the atmosphere source, types and effect of environmental pollution, wasted water treatment, composition of domestic waste. Water chemistry and analysis. Chemical and physical instrumentation in environmental sciences. 45h (T)

CHM 402: REACTION KINETIC – 2C

Review of first, second and third order rate equations. Rate constant and equilibrium constants. Unimolecular reaction theory, bimolecular reaction mechanism, chain reaction mechanism, catalysis and heterogeneous reaction. Mechanisms of photochemical reaction.

Pre-requisite CHM 312, or CHM 412 30h (T)

CHM 404: RADIOCHEMISTRY AND NUCLEAR CHEMISTRY -2C

Natural radioactivity, erosion, fusion, fission, decay processes, nature of radiation. Nuclear models, energy of nuclear reaction, principles and measurement of radioactivity. Application of radioactivity, radiation hazards.

Pre –requisite CHM 302 30h (T)

CHM 405: ANALYTICAL CHEMISTRY II – 2C

Theory of error, potention meter and pH methods. Conduct –metric methods. Electrolytic methods. Radiochemical methods. Chromatography.

Pre –requisite CHM301 30h (T)

CHM 407: ORGANIC SYNTHESIS – 2C

Concept of synthesis. Use of basic functional group concepts in complex synthesis schemes. Methods of formation of C –H, C–C, C-X, and C –N bonds. Oxidation, reductions. Use of metal hydrides, hydrogenation. Reactive intermediates carbenes, nitreness, arynes Simons –smith cyclopropane synthesis yields. Organic –metallic compounds in synthetic organic chemistry.

Pre –requisite CHM 303 30h (T)

CHM 415: CO-ORDINATION CHEMISTRY -2C

Co –ordination compounds –Definition, application, Nomenclature, co –ordination formula and isomerism in complexes, stereochemistry of complex molecules. Theories of structure and bonding. Physical methods of structural investigation. Magnetic properties. Absorption and vibrational spectra. The spectra-chemical series. The nephelauxetic series and the John –Teller distortions. Stabilization of unusual oxidation states by complex formation. Thermodynamic stability of complex, the stability constant, the chelate effect, preparation and reactions of complexes, kinetics and mechanisms.

Pre –requisite CHM 302 30 h (I)

CHM 417: CHEMISTRY OF LANTHANIDES AND ACTINIDES -2C

The elements and the position of the two series in the periodic table. The electronic configuration and their sequence 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.

Pre –requisite CHM 303 30h

CHM 419: INDUSTRIAL CHEMISTRY PROCESS – 2C

Chemical processing of minerals. Metallurgy and hydrornctlluruical processes. Industrial electrochemicals, Manufacture of some heavy inorganic chemicals, cement and binding materials, inorganic fertilizers.

Pre –requisite CHM 321 30h (T)

COMPUTER SCIENCE EDUCATION

(b) Programme/Sub-Discipline Philosophy and Objectives Philosophy

(i) Philosophy Aims and Objectives

The purpose, aims and objective of bachelors honours degree programme in computer science should include:

(a) To create in students the awareness of and enthusiasm for computer science and its capabilities.

(b) To involve the students in an intellectually stimulating and satisfying experience of learning and studying.

(c) To provide a broad and balanced foundation in computer science knowledge and practical skills.

(d) To develop in students through an education in computer science a range of transferable applicable skills of information technology to all aspects of human endeavours.

(e) To provide students with knowledge and skills base for further studies in computer science or multi-disciplinary studies involving computer science.

(ii) Admission Requirements

As in other Education Arts programmes. However, a credit pass in Biology, Chemistry, Physics, Mathematics and English Language at the Senior School Certificate is required in addition to other requirements.

(a) UME Entry

Candidates are expected to obtain SSC O' level with credit passes in at least five subjects including English Language, Mathematics and Physics.

(b) DIRECT ENTRY

Candidate must have at least merit passes in Chemistry at N.C.E and Education or any other subject, or GCE 'A' level passes including Physics.

(iii) Programme Structure

The B.Sc (Ed) degree programme has four-year and three-year duration for UME and Direct Entry students respectively. The courses in 100, 200 and 300 levels are designed to equip the students with fundamental knowledge of science, computer and skills in teaching. They also take general courses like GST and other elective courses from any of the teaching subject areas approved by the Department. At 400 level, in addition to Computer Education courses, students carry out research works (projects) on an approved topics. The project which is supervised by a lecturer in the Department is also defended before a panel of lecturers in the Department.

B.Sc (Ed) Degree in Computer Science Education

100 Level First Semester

Course Code		Course Title	Units
EDU	100	Introduction to Teaching Profession	2C
EDU	101	Foundations of Education	2C
GST	101	Use of English and Library	4C
GST	102	Logic, Philosophy and Human Existence	2C
PHY	101	General Physics I (Mech. & Thermal Physics and Waves)	3C
MTH	102	Elementary Mathematics II (Calculus)	3C
MTH	101	Elementary Mathematics I (Algebra & Trigonometry)	3C
CSC	101	Introduction to Computer Science	3C
			22 units
			Total (Core = 19, Elective = 0)

100 Level Second Semester

Course Code		Course Title	Units
GST	111	Nigerian Peoples and Culture	2C
GST	112	History and Philosophy of Science	2C
GST	113	Peace Studies & Conflict Resolution	2C
PHY	111	General Physics II (Electricity, Magnetism & Modern Physics)	2C
MTH	111	Elementary Mathematics III (Vector, Coordinate Geometry & Dynamics)	3C
CSC	112	Introduction to Problem Solving	3C
CSC	113	Computer Laboratory	1C
BOT	111	General Botany	3C
EDU	114	Introduction to Language Education	2E
SED	111	Science Technology & Society	2E
			22 units
			Total (Core = 18, Elective = 4)
		Grand Total	**44 Units**

200 Level First Semester

Course Code		Course Title	Units
EDU	200	Principles of Instruction	2C
EDU	202	Curriculum Theory and Development	2C
EDU	203	Micro Teaching (Teaching Skills)	2E
CSC	202	Computer Programming I (Concept of Object Oriented programming)	3C
CSC	203	Human Computer Interaction	3C
CSC	204	Digital Computer Logic	3C
CSC	205	Operating System I	3C
CHM	101	General Chemistry I	3C
MTH	201	Mathematics Methods I	3C
MTH	202	Linear Algebra I	3E
			27 units
			Total (Core = 22, Elective = 5)

200 Level Second Semester

Course Code		Course Title	Units
EDU	211	Special Methods of Teaching	3C
EDU	212	Test & Measurement	2C
CES	211	Entrepreneurship and Innovation	2C
CSC	213	Computer Programming II (Computation)	3C
CSC	216	Computer Hardware and Sequential Programme	3C
PHY	214	Electronics I	2C
MTH	211	Set, Logic and Algebra (Discrete Structure)	3C
SED	215	Science Education Methods	2E
			20 units
			Total (Core = 18, Elective = 2)
		Grand Total	**47 Units**

300 Level First Semester

Course Code		Course Title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration and Planning	2C
EDU	302	Educational Technology	2C
CSC	302	Data Structure and Algorithms	3C
CSC	305	Operating System II	3C
CSC	307	Computer Programming III (Object Oriented Programme)	3C
CSC	306	Computer Architecture	3C
CSC	308	Software Development Dynamics	3C
CSC	309	Artificial Intelligence	3E
EDU	303	Childhood Education	2E
		Core Courses	**22**
		Elective Courses	**2**
		Total	**24**

SECOND SEMISTER

Course Code		Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Methods and Data Processing	2C
EDU	313	ICT in Education	2C
CES	311	Entrepreneurship Studies (Business Creation and Growth)	2C
CSC	311	System Analysis and Design	3C
CSC	312	Compiler Construction and Design	3C
CSC	318	Survey of Programming Languages	3C
CSC	319	Extended Object Oriented and Structure Programming	3C
CSC	317	Distributed Computing	3E
SED	312	School Science Laboratory	2E
		Core Courses	**20**
		Elective Courses	**05**
		Total	**25**
		Grand Total	**52**

400 Level First Semester

Course Code		Course Title	Units
EDU	401	Practical Teaching	3C
EDU	402	Guidance and Counseling	2C
EDU	404	School Administration and the Law	2C
SED	407	Seminar	2C
CSC	403	Database Management	3C
CSC	405	Net-centric Computing	3C
CSC	407	Industrial Attachment(SIWES)	6C
CSC	401	Design Analysis and Computer Algorithms	2E
EDU	403	Continuous Assessment	3E
		Core Courses	**21**
		Elective Courses	**05**
		Total	**26**

Second Semester

Course Code		Course Title	Units
EDU	410	Research Project	6C
EDU	411	Special Education	2C
CSC	411	Software Engineering	3C
CSC	412	Computer Network and Communication	3C
CSC	415	Organization of Programming Language	3C
CSC	414	Mobile Computing	3C
CSC	413	Networks and Information System Security	3E
SED	412	Circle in Nature	3E
		Core Courses	**20**
		Elective Courses	**06**
		Total	**26**
		Grand Total	**52**

Old

Course registration for 300 Level Computer Science Education

FIRST SEMESTER

COURSE	COURSE TITLE	UNITS
EDU300	Teaching Practice	3C
EDU301	Intro. To Educational Administration and Meaning	2C
EDU302	Educational Technology	2C
EDU307	Micro Teaching	2C
CSC 302	Data Structure and Algorithm	3C
CSC 305	Operating System II	3C
CSC 308	Software Development Dynamic	3C
	TOTAL	**18**

SECOND SEMESTER

COURSE	COURSE TITLE	UNITS
EDU 311	Educational Psychology	2C
EDU 312	Research Methods and Statistics	2C
CSC 311	System Analysis and Design	3C
CSC 312	Compiler Construction	3C
CSC 318	Survey of Programming Languages	3C
CSC 319	Extended Object Oriented Programming	3C
CES 311	Skill Acquisition	2C
	TOTAL	**18**
	GRAND TOTAL	**36**

400 LEVEL

FIRST SEMESTER

COURSE	COURSE TITLE	UNITS
EDU401	Teaching Practice	3C
EDU402	Introduction to Guidance and Counselling	2C
EDU403	Continuous Assessment	2E
EDU407	Research Seminar	2C
CSC 401	Design and Analysis of Computer Algorithms	3C
CSC 403	Database Management	3C
CSC 407	Industrial Attachment (SIWES)	6C
	TOTAL	**19**
	Total electives	**2unit**

SECOND SEMESTER

COURSE	COURSE TITLE	UNITS
EDU410	Research Project	4C
EDU411	Organization and Administration of Primary and Secondary Education	2C
EDU412	Comparative Education	2C
EDU413	Adolescent Psychology	2E
CSC 411	Software Engineering	3C
CSC 412	Computer Network and Communication	3C
CES 414	Mobile Computing	3C
	TOTAL	**18**
	GRAND TOTAL	**38**

Total core courses – 17units

Total electives – 2units

Summary

Total units of Core Courses for the Session - 36Units

Total Units of elective Courses for the Session - 4Units

Grand Total - 40 Units

COURSE DESCRIPTION - COMPUTER SCIENCE

CSC 101: Introduction to Computer Science- 3C

History of computers, functional components of a computer characteristic of a computer. Data Representation, problem solving flow charts, and algorithms. The internet. BASIC computer programming, statements, symbolic names: arrays, subscripts expressions and control statements. Introduction to BASIC and Visual Basic Programming Language. Computer Applications.

CSC 112 : Introduction to Problem Solving with Computers (3Units)

An introduction to many computer sciences topics relating to problem solving. Problem solving definition. Steps involve in problem solving. Algorithms development. Simple language design and pseudo code. Problem statement with algorithms. Pseudo code and flowchart designs. Flow charting symbol. Problem solving strategies. role of algorithms in problems solving process, implementation strategy, concept and properties of algorithms, program development , flowchart and algorithm. Program objects, operations, expression and assignments, conditional stut, Boolean Expression. Scope of identifiers, life time of variables, arrays. Translation of algorithms, Pseudo code to VB language. Introduction to VB, Practical Aspects.

CSC113: Computer Laboratory I (l Unit)

Practicals involving introduction to fundamental hardware components.

Problem solving involving all programming language environments.

CSC200: Introduction to Computer (2Units)

History of computers, functional components of a computer, characteristics of a computer, Data Representation, problem solving, flow charts, and algorithms. The internet. BASIC computer programming, statements, symbolic names: arrays. subscripts ‘expressions and control statements. Introduction to BASIC and Visual Basic Programming Language. Computer Applications.

CSC201: Introduction to Data Processing and Software Packages (3Units)

Data Processing Concepts. electronic data processing and computers. files computer applications. Staffing and system control communications, the Internet, current trends in computing computer careers. Aims and objectives of packages. structure of packages, usage and areas of applications of packages, capabilities and limitations of popular packages. Distinction between packages and conventional computer languages.

Practical sessions on the use of the following packages:

i. Spreadsheet: Lotus 1.2 3 or Excel
ii. Word Processing: Word Perfect or Ms Word
iii. DBMS: Dbase, Oracle. Access
iv. Design: MS PowerPoint or Corel Draw

CSC202: Computer Programming I (Concepts of Object Oriented Programming) (3Units)

Introduction to object Oriented Programming Concept (e.g. Paradigm, OOP Language Features); generic programming: Classes/Objects, encapsulation, Messages and Methods, Inheritance, Polymorphisms, basic data structures, Graphical User Interface (GUI); exception' handling, Utilities and Packages. Using Object Oriented programming' language such as Visual BASIC, C++/C#/

203: Human Computer Interaction (3Units)

Introduction to basic principles and methodology for good user interface design, drawing on a background of human information processing and human factors. Techniques for user-centered analysis and design; use of proto typing tools, introduction to Usability Engineering and other evaluation methods; methods for enhancing system usability and systems ergonomics.

CSC204: Digital Computer Logic(3 Units)
Number Systems Conversion revision. 33oolean Algebra and applications. Describing logic Circuit: OR, ANID, NOT operations and Gates; Boolean and Demorgains Theorems. Rarnaugh Maps. Combinational Logic Designs, Multi-level Gate Circuit, NAND and NOR Gates; Multiplexes, Decoder and Programmable Logic Devices; Digital Arithmetic Operations; Binary and Full Adder. Latches and Flip-flops; Registers and Counters.

CSC205: Operating Systems I (3Units)
Introduction to Operating Systems, Schematic diagram of a computer operating system Operating, Operating system user view, system view, Systems Principles, functions of Operating Systems. Batch, Interactive, Time-sharing, Real-Time, Disoriented and Clustered System, Multi-Processing, Multi-tasking, Multiprogramming Concepts. Single and Multiprocessor Systems: symmetric and Asymmetric Multiprocessing. Traps and Interrupts. Instruction Cycles, Interrupt Processing, File-System Memory management.

CSC206: Computer Laboratory II (l Unit)
Practical Problem solving in Object Oriented Environments e.g. C++, Java, Design, Testing, Debugging and Implementation of Objects Oriented Programs. Programming projects and Assignments.

CSC213: Computer Programming II (3Units)
Simple programming concepts. Basic types, statements, operators and expressions in programming language, Functions, Pointers, Arrays and References. Structured types, Overloading, Input and Output. Object- oriented Programming, Concepts of Object Oriented(OO) modeling, design, and programming in a high-level OO programming language, design an OO model and implement the model in a high-level OO language using objects, classes, inheritance, collections, conditionals, iteration, Simple graphical user interfaces and networked programs, common 00 design

patterns, Effective documentation, layout, debugging and testing, Java: Classes, objects, types, control flow, libraries, inheritance, documentation with JavaDoc, using Java from command line and an Integrated Development Environment, unit tests
Programming language such as Java is recommended.

CSC2I4: Introduction to Simulation Methods (3Units)
Types of Simulation Analogue, Continues and Discrete Model, Event Type or Discrete Simulation. Random Phenomena in Simulation: Generation of Random Deviates and Generation of random numbers. Statistical Analysis in Simulation: Transient and Steady State Conditions, Gathering Observations in Simulation. The use of Fortran for Computer Simulation Studies, standard frequency. Distribution and other simulation languages.

CSC216: Computer Hardware and Sequential Programme (3Unit)
Introduction to computer systems, computer system parts, maintenance techniques, approaches and tools; diagnostic techniques; system assembly and installation; troubleshooting and repair of computer systems and accessories: portable computers, Von Neumann Architecture, Different hardware components of a basic system. Decoder and programme the logic devices. Microprocessors and Microcomputers, Computer Logic circuits.

CSC302: Data Structure and Algorithm (3Units)
Data Structure and representation. Binary trees. Transversal algorithm, recursion, block programming techniques, searching and sorting, algorithms, symbols algorithm, symbols tables and hashing, files;: access methods and organization. Internet and external files, application of B-Trees.

CSC305: Operating Systems II (3Units)
Processes and Process concept, process state and process control block, Threads process scheduling, Queue-Ready queues, Input/output devices queues scheduling: Long term or Job

Scheduler, Short- term or CPU scheduler medium term scheduler, degree of multiprogramming, Context switching, operation on processes- process creation and termination. Interprocess communication, shared memory systems, message passing, naming, synchronization, and buffering, scheduling policies: first-come-first served, round robin concurrency and concurrency problems: dining philosophers, barbers problem deadlock, starvation, conditions for dead lock, consumer problem

CSC306: Computer Architecture (3 Units)
Overview and history of computer architecture; logic expressions. minimization , sum of product forms: fundamental building blocks (logic gates, flip-flops. counters. registers); machine level representation of data; basic organization of the von Neumann architecture; control units; instruction fetch, decode and execution; storage systems and their technology; RAID architectures.

CSC307: Computer Programming III (3Units)
HTML on air structural elements, starting with the <head>. Writing text by structuring main content area. HTML Global attributes. Developing forms and styling new form fields and error messages. canvas basis. Data storage. Drag and Drop. Geolocation. messages, Workers and Sockets. Web development using web authoring tool i.eASP.ne PHP

CSC308: Software Development Dynamics (3Units)
Basic concepts and Preliminaries of Software evolution and maintenance. The laws of evolution. Software maintenance activities (corrective, adaptive and perfective) Software Evolution Models and processes. Software maintenance standards (IEEE, ISO, ISO IIEC, IEEE/EIA). Software Configuration Management (SCM). Software Reengineering. Legacy Systems. Impact Analysis, Refactoring, Program Comprehension Software Reuse, Software Reliability, Software Dependability, Software Verification and

Validation, Software Testing, Software Quality Measurement/Assurance. Software Metrics.

CSC309: Artificial Intelligence (3Units)
An overview of artificial intelligence, knowledge, acquisition, representation, reasoning and inference, search and constraint satisfaction, machine learning techniques and neural networks and their applications.

CSC310: Database Concepts (3Units)
Fundamental principles and concepts of the database systems, DBMS architecture. Databases and data modeling. Services of DBMS. Overview of database languages. Queries, integrity, constraints, aggregate operations. Inference rules for user views. The relational model. Mapping from a conceptual model to a relational mode Database design methodologies.

CSC311: Systems Analysis and Design (3Units)
Planning project. Feasibility study. System life cycle. Design c computerized systems. Systems installation and maintenance Decision Tables in programming decision-making. System Analysis and Design Overview, System Description and Modelling Technique Theory and Methodologies for System Requirements, Analysis an Logical Design including User interface Design, Physical Design an Implementation, Modern Systems Development tools, System Development management, Cultural, Social and International Issue related to systems development, Current Issues in System development Project on system analysis and design.

CSC312: Compiler Construction (3 Units)
Logical analysis, lexical and syntactic analysis. Code generation, cod optimization, translator-writing systems, general language terminology' Precedence: operator precedence, u-parse, top down and bottom-u parsing, grammars.

CSC314: Research Methods in Science (3Units)
Introduction statistical necessary to conduct and evaluate research problem. Research topic formulation and definition information gathering techniques. Elementary Sampling Survey, Questionnaire design, etc. literature review. Data presentation and analysis. Drawing conclusion and making recommendations.
Referencing/Bibliography. Acknowledgments. Projects report design Appendices. The sue of computer in data analysis and repo presentation. Seminar presentation, project/thesis defense. Note students will be required to conduct a simple research within the University town to demonstrate the research skills acquired.

CSC317: Distributed Computing (3Units)
Topics include Characteristics and design issues of distributed system (DS), DS architecture, network, operating system, applications, design and implementation of DS, performance, security and reliability issues.

CSC318: Survey of Programming Languages (3Units)
Comparative study of basic structures and implementations of some types of programming languages control structures data flow: subroutine; interrupts; block structure, scope of variables, information binding, mechanisms of procedures and parameters, data storage and mapping, execution environments comparative programming examples from procedure oriented, list processing, interactive and other types of programming languages: functional logic and object oriented extensions to conventional programming languages.

CSC319: Extended Object Oriented and Structural Programming (3Units)
Procedural programming and its limitations. Software development methodology: fundamental design concepts and principles; structured design; testing and debugging strategies; test case design; programming environments; testing and debugging tools.

Basic concepts and formal methods of Object Oriented Programming (OOP). Study of the features of a popular Object Oriented Programming Language such as JAVA, Visual Basic and C++. Applications of OOP in Systems software development.

CSC401: Design and Analysis of Algorithms (3Units)
Measuring of Algorithm performance: Time and space; worst case anajysis, average case analysis; lower bounds. Techniques of efficient algorithm design: divide and conquer, greedy method, dynamic programming, graph traversal. Illustration with topics from integer and polynomial arithmetic; matrix multiplications; random number generations; sorting; searching; graph and tree algorithms. Introduction to complexity theory. Parallel and randomized algorithms.

CSC402: System Programming (3Units)
Introduction to Systems Programming. Process control and scheduling. Processes, Threads and Threads programming. Memory Management Programming. Distributed Systems and Client Server Programming. UNIX socket programming. Java Systems programming. SWING, multithreading and networking. History of the Unix operating system; System commands; Regular expressions and commands that use them: sed, awk, grep, etc; Shell programming: I introduction to C programming; Debugging; Low-level input/output Files and directories; Signals, processes, Interprocess communication; Using make and versioning systems.

CSC403: Data Base Management (3Units)
Database systems development framework; planning; logical ant physical database design. Query processing, backup and recovery Concurrency Management; Performance tuning, Database security Integrity and control. Database Systems architectural frameworks client/Server, Distributed and parallel database systems. Object oriented databases. Data and Database Administration Data Warehouse Database design; Web-Database Systems, database

programmin languages. Current trends in data base research and beast practice.

CSC404: Seminar(Special Topics in Computer Science (2Units)
Special Topics Chosen from a variety of computer area including applications in various fields, computer installation, staffing an administration, computer maintenance, software engineering e.t.c ITF experience and Report to be presented alongside seminar report.

CSC405: Net-Centric Computing (3Units)
Types of coding system binary, etc. some basic codes and their construction, and advantages. Basic communication system an definitions. Information measure, entropy capacity of (i) discret noiseless channels (ii) continuous Gaussian noise channels, ending t match source to channel.

CSC406: Web Technology and Application (3Units)
The Internet, internet and web technologies overview of system developments; rapid applications development concepts; we application development cycle, web application architectures; we developments environments; web development technologies such m Markup Languages; Java Script, Java VRML, VB Script, Active X, CGI, Database Connectivity, etc. web applications; web development using web-authoring tools; Database web Connectivity; Scripting Languages for web development, web application , Client Server Technologies and infrastructure; multitiered system design and implementation, and current issues and trend; major Web Application development project.

CSC407: Industrial Attachment(6Units)
Students will be required to spend 3 months in a relevant Economics, Industrial or Research Institution, for a first hand appreciate of the applications of Computational ideas: At the end, a

written report will be submitted to the Department. Evaluation of students shall be based on:

i. The outcome of a supervisory visit by a senior member of academic staff.
ii. The merit of the student's write up or report.
iii. A confidential assessment report of the student provided by the industry based supervisor.

CSC4I0: Research Project (6Units)
A project to be chosen and approved by the department and under the direction and supervision of a project Lecturer.

CSC411: Software Engineering (3Units)
Software engineering principles; conventional development. Requirement analysis, architectural high level design, implementation, testing, maintenance,. Formal development. Project planning and control. Metrics and measurement. Software reliability modeling. AI/KBS approaching environments, AI/KBS development techniques. Principles of object oriented systems. Prototyping. Software reuse.

CSC412: Data Communication and Networks (3Units)
Introduction, waves, Fourier, Analysis, measure of communication, channel characteristics, transmission media, noise and distortion, modulation and demodulation, multiplexing TDM, FCM. Parallel and serial transmission (Synchronous asynchronous). Bus characteristics, structures and loop systems, computer networks; Topologies, Hubs, Repeaters, Gateways. Examples and design considerations: data switching principles: broadcast techniques; network structure for packet switching, protocols, description of networks, e.g. ARPANET, DSC, INTERNET, WORKD WIDE WEB (WWW), etc.

CSC413: Network and Information System Security (3Units)
Network Security, Forensic Investigation Methods, Biometric Analysis Network Attack. Security fundamentals; Business Needs;

Legal, Eth ic and Professional Issues; Risk Management; Policies, Standards am Practices; Security Technology; firewalls and VPNs; Security Technology; Intrusion Detection, Access Control and other Security: Tools; Cryptography; Physical Security; implantation Information Security: Information Security Credentials, Security and Personnel Maintaining Information Security. Topics covered include; overview o computer networks, overview of computer security, system vulnerabilities (administrative, application, and network) cryptography, digital signatures, authentication protocols, network management.

CSC414: Mobile Computing (3Units)

Foundations of Mobile and ubiquitous computing: Mobile society, information society, pervasive and self learning environment information and piracy.

Mobile devices platforms: current and future devices sensors and tags Integrated local platforms, Global platforms and SOA.

Location techniques and space monitoring: Positioning technologies location systems, location management, position forecasting Geographic and geometric space models, symbolic space models Ubiquitous computing: Introduction, examples, physical-virtual integration and interaction models. Software Architectures for ubiquitous computing: Design Principles for smart spaces pervasive computing, software infrastructures for pervasive computing environments, Global service for smart spaces. Real World deployment: Robustness, maintenance and usability issue Assessment of ubiquitous systems, legal aspects. Introduction to Mobil Computing and wireless networks, wireless technologies; Wimax, Wifi, Bluetooth, ad hoc networks, GSM 802.11.802.15 Mobil IP, Mobil Routing, Mobile Device Architectures; Energy Modelling and Management; Mobile Software and Applications.

CSC415: Organization of Programming Language (3Units)

Origin of programming language and characteristics of languages, concepts of modern programming languages, Design and

implementation techniques; object oriented programming; logic programming, visual programming, parallel programming, computer optimization and programming language.

CSC416: Special Topics in Software Engineering (3Units)
Special Topics in Software engineering principles; conventional development, Requirement analysis, architectural high level design, implementation, testing, maintenance, Formal development. Project planning and control. Metrics and measurement. Software reliability modeling

INTEGRATED SCIENCE

(b) Programme/Sub-Discipline Philosophy and Objectives

Philosophy

(i) Philosophy

The Philosophy of Integrated Science which is a sub-set of philosophy of Science Education in Delta State University is to produce suitably qualified manpower to teach Chemistry in Secondary Schools. The era of Information Communication Technology (ICT) has broadened the scope to application of computer in the teaching of Integrated Science. The programme of Integrated Science is therefore structured to equip the students for effective performance of their duties in the instructional process and in classroom management. The students are to be exposed to the principles, practices and theories of teaching with special reference to Integrated Science.

(ii) Objectives

The main objective of Integrated Science Programme is to produce graduate teachers in Integrated Science with sound academic and professional training in Integrated Science. Specific objectives of the programme include to:

1. enable students to gain the concept of the fundamental unity of Science.
2. Provides learning opportunity which will help the students, acquire experience in the basic skills for effective implementation of integrated science curriculum in secondary schools.
3. develop in students the spirit of inquiry into living and non-living things and energy changes in the environment.

(iii) Admission Requirements

(1) UME Entry

Candidates are expected to obtain SSC O' level with credit passes in at least five subjects including English Language, Mathematics, Chemistry and Biology.

(2) DIRECT ENTRY

Candidate must have at least merit passes in Integrated Science at N.C.E or any Science Education with merit passes in Education and other Science subjects or GCE 'A' level in two subjects or Diploma in Integrated Science with lower credit.

(iv) Programme Structure

The B.Sc (Ed) degree programme has four-year and three-year duration for UME and Direct Entry students respectively. The courses in 100, 200 and 300 levels are designed to equip the students with fundamental knowledge of science, Integrated Science and skills in teaching. They also take general courses like GST and other elective courses from any of the teaching subject areas approved by the Department. At 400 level, in addition to Integrated Science courses, students carry out research works (projects) on an approved topics. The project which is supervised by a lecturer in the Department is also defended before a panel of lecturers in the Department.

B.Sc (Ed) Degree in Integrated Science

100 Level First Semester

Course Code		Course Title	Units
EDU	100	Introduction to Teaching Profession	2C
EDU	101	Foundations of Education	2C
AEB	101	Principles of Animal Biology	3C
CHM	101	General Chemistry I	3C
GST	101	Use of English and Library	4C
GST	102	Logic, Philosophy and Human Existence	2C
MTH	101	Elementary Mathematics I (Algebra and trig.)	3C
PHY	101	General Physics I (Mechanics Thermal Physics and Waves)	3C
SED	101	Biology for Integrated Science	2E
			24units
			Total (Core = 22 Elective = 2)

100 Level Second Semester

Course Code		Course Title	Unit
BOT	111	General Botany	3C
CHM	111	General Chemistry II	3C
GST	111	Nigeria Peoples and Culture	2C
GST	112	History and Philosophy of Science	2C
GST	113	Peace Studies and Conflict Resolution	2C
PHY	111	General Physics II (Electricity, Magnetism and Modern Physics)	3C
PHY	112	General Physics Laboratory	2C
SED	111	Science, Technology and Society	2C
SED	112	Chemistry for Integrated Science	2E
EDU	114	Introduction to Language Education	2E
			23 units
			Total (Core = 19, Elective = 4)
			Grand Total 47 Units

200 Level First Semester

Course Code		Course Title	Units
EDU	200	Principles of Instruction	2C
EDU	202	Curriculum Theory and Development	2C
EDU	203	Micro Teaching (Teaching Skills)	2C
EDU	201	Philosophy of Education	2C
AEB	204	General Physiology	2C
CHM	202	Inorganic Chemistry	2C
CSC	200	Introduction to Computer	2C
MTH	201	Mathematical Method I	3C
MTH	102	Elementary Mathematics II (Calculus)	3C
PHY	201	Elementary Modern Physics	3C
Total (Core = 23)			**23 units**

200 Level Second Semester

Course Code		Course Title	Unit
EDU	211	Special Methods of Teaching	2C
EDU	212	Test & Measurement	2C
BIO	212	Introduction to Ecology	2C
CES	211	Entrepreneurship & Innovation	2C
CHM	211	Analytical Chemistry	2C
SED	211	Energy & Matter I	2C
SED	212	Nigerian Integrated Science Curriculum	3C
SED	213	Industrial Process/Application	3C
SED	214	Physics for Integrated Science	2E
SED	215	Science Education Methods	2E
TOTAL (Core = 18, Elective = 4)			**22 units**
		Grand Total	**45 Units**

300 Level First Semester

Course Code		Course Title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration and Planning	2C
EDU	302	Educational Technology	2C
SED	301	The Earth and the Universe	2C
SED	302	African Cosmology in Integration in Science	2C
SED	303	Environment and Population	3C
SED	304	Energy and Matter II	2C
SED	305	Science and Mathematics	2E
SED	306	Material: Structure, Behaviour and Uses	2E
TOTAL (Core = 16, Elective = 4)			**20 units**

300 Level Second Semester

Course Code		Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Methods and Data Processing	2C
EDU	313	ICT in Education	2C
CES	311	Entrepreneurship Studies (Business Creation & Growth)	2C
SED	311	Integrated Science Workshop	3C
SED	312	School Science Laboratory	2C
SED	314	Assessments and Evaluation in Int. Sci.	2C
SED	313	Nigerian Prim. & SEC. Sch. &Maths. Curr.	2E
SED	318	Curriculum Implementation & Evaluation	2E
Total (Core = 15, Elective = 4)			**19 units**
		Grand Total	**39 Units**

400 Level First Semester

Course Code		Course Title	Units
EDU	401	Practical Teaching	3C
EDU	402	Guidance and Counselling	2C
EDU	404	School Administration and the Law	2C
SED	401	Practice in Integration of Science	3C
SED	403	Nigerian Industries and Industrialization	3C
SED	407	Seminar	2C
EDU	406	Curriculum Innovation and Revision	2E
SED	404	Movement of Organisms and Materials	2E
		Total (Core = 15, Elective = 4)	**19 units**

400 Level Second Semester

Course Code		Course Title	Units
EDU	410	Research Project	6C
EDU	411	Special Education	2C
SED	411	Integrated Science Curriculum Design and Implementation	3C
SED	412	Cycles in Nature	3C
SED	414	Man Uses Energy III	3E
SED	415	Graphical Methods in Science &Maths	3E
Total (Core = 14, Elective = 6)			**20 units**
		Grand Total	**39 Units**

Old

300 Level First Semester

Course Code	Course Title	Units
EDU 300	Teaching Practice	3C
EDU 301	Introduction to Educational Administration & Planning	2C
EDU 302	Educational Technology	2C
EDU 303	Childhood Education	2E
EDU 304	Rural Education	2E
EDU 305	Educational Statistics	2E
SED 301	The Earth and the Universe	2C
SED 302	African Cosmology in Integration in Science	2C
SED 303	Environment and Population	3C
SED 304	Energy and Matter II	2C
SED 305	Science and Mathematics	2E
SED 306	Material: Structure, Behaviour and Uses	2E
TOTAL (Core = 16, Elective = 10)		**26 Units**

300 Level Second Semester

Course Code	Course Title	Units
EDU 311	Educational Psychology	2C
EDU 312	Research Method and Data Processing	2C
EDU 313	ICT in Education	2E
EDU 314	Emergent Problems in Nigeria Education	2E
EDU 315	Introduction to Economics Education	2E
SED 311	Integrated Science Workshop	3C
SED 312	School Science Laboratory	2C
SED 313	Nigerian Prim. & SEC. Sch. & Maths Curr.	2C
SED 314	Assessments and Evaluation in Int. Sci.	2C
SED 315	Mathematics for Integrated Science	2E
SED 316	Curriculum Implementation & Evaluation	2E
SED 316	Caring for Yourself	2E
SED 317	ICT in Science Education	2C
CES 311	Business Creation & Growth	0C
Total (Core = 15, Elective = 12)		**27 Units**

400 Level First Semester

Course Code	Course Title	Units
EDU 401	Practical Teaching	3C
EDU 402	Introduction to Guidance and Counselling	2C
EDU 403	Continuous Assessment	2E
EDU 404	Education Law	2E
EDU 405	Sociological Theory	2E
EDU 406	Curriculum Innovation and Revision	2E
SED 401	Practice in Integration of Science	3C
SED 402	Project in Integrated Science Education	3E
SED 403	Nigerian Industries and Industrialization	3C
SED 404	Movement of Organisms and Materials	2E
SED 406	Materials and Activities in Science	2E
SED 407	Seminar	2C
Total (Core = 13, Elective = 15)		**28 Units**

400 Level Second Semester

Course Code	Course Title	Units
EDU 411	Org. and Administration of Prim. & Sec. Edu.	2C
EDU 412	Comparative Education	2C
EDU 413	Adolescent Psychology	2E
EDU 410	Research Project	4C
SED 411	Integrated Science Curriculum Design	3C
SED 412	Cycles in Nature	3C
SED 413	Science, Technology and Society	3C
SED 414	Man Uses Energy III	2E
SED 415	Graphical Methods in Science & Maths	2E
Total (Core = 17, Elective = 6)		**23 Units**

INTEGRATED SCIENCE COURSE DESCRIPTION

SED 111: Science, Technology and Society —2C
Socio-political aspect of Science and Technology, health and diseases, the efforts on the environment of fake food, water, waste disposal. Application of science ‘and technology of everyday life. Basic scientific principles, involved in. the design and functioning of everyday appliances, devices, system and phenomena, relevance of the school science curricular to societal needs.

SED 215: Science Education Methods — 2E
An experience in the scientific methods and inquiries, problem-solving and discovery approaches in science teaching. The step-wise approach to scientific research as method of investigation in sciences.

SED 317: ICT in Science Education – 2C
An application of the principles of Information and Computer Technology to Education

SED 318: Curriculum Implementation and Evaluation — 2E
Elective Understanding of Implementation strategies process of curriculum delivery and evaluation of existing curriculum. Skills for determining effectiveness of developed curriculum

SED 407: Research Seminar – 2C
Write up and scheduled of prepared paper based on Education related matters and issues.

SED 204: History and Philosophy Science — 2C
Nature of the subject, Development of the teaching of the subject in Nigeria schools. The philosophy behind the subject and its teaching.

SED 211: Energy and Matter— 2Units Core
Energy, meaning and measurement, sources of energy, physical, chemical biological and gaseous, energy transformation, energy of the universe, energy cycle, forms and uses of energy, energy dissipation, energy consumption need and consumption rate by man, energy equation.

SED 212: Nigeria integrated Science Curriculum — 3C
A critical examination (NICS) to identify difficult topics/units and discuss effective methods of approaching them. An advanced treatment of some of the topics not considered in the basic science treatment.

SED 213: Industrial Process and Application —3C
The industrial processes, operations and applications. The scientific process involved in the synthesis or manufacture of the important items used in industry and everyday life as paints, textiles, brewing, petroleum, ore smelting, cement, fertilizers, food processing and preservation.

SED 301: The Earth and the Universe — 2C
Geologic case scale, atmosphere, rocks (types and formation), test for common rocks, occurrence of minerals. The moon and the Earth, phases of the moon, eclipse. The solar system, space exploration.

SED 302: African Cosmology in Integrated Science — 2C
African mythology and science, African concern for the universe, conception of reality, explanation of some natural phenomena — rainbow, echo, mirage lightning and thunder, twins etc. The use of numbers in African tradition, ways of knowing African belief system compared to science, possible ways of curbing superstitious beliefs through integrated Science. Identification of elements of Integration in African Traditional Science (ATS)

SED 303: Environment and Population —3C
Reproduction. Growth and development in plants and animals, conception of community, ecosystem, energy flow and circulation and-materials, plant succession, human evolution. human populations and housing. Man's dependence on plants and animals.

SED 304: Energy and Matter— 2C
Energy and health, light energy, production, energy consumption conveniences, energy and growth, and photo-electricity Entropy and chemical processes. Radiation and effect of energy and light in crop in factories, temperature and human nuclear energy splitting of atom, energy experimental application-in physical and radiation effect on life awl weather.

SE 305: Science and Mathematics — 2E
Mathematical concepts applied in Science, Mathematical methods in scientific problems, Boundaries between Mathematics and other sciences. Interdisciplinary issues between Mathematics and Sciences and Quantitative analysis in Laboratory activities.

SED 306: Material Structure, Behaviour and Uses — 2E
The course examines state of materials, metals and non metals, glasses, ceramics and plastics.

SED 311: Integrated Science Workshop —3C
Basic tools application in workshop construction.

SED 312: School Science Laboratory — 2C
An examination of the concept of the school science laboratory as instructional faculty. Objectives of school science teaching. Achievable through the use of the laboratory. Laboratory design organization and management. Safety laboratory, skill description in aspects of laboratory work and construction of basic teaching resources.

SED 313: Nigeria Primary and Secondary School Science and Mathematics Curriculum – 2E

Objectives of primary and secondary school and mathematics curricular. Organization of each curriculum and suggested methods training. Treatment of selected topics and activities. Implementation of the Curriculum (an evaluation).

SED 314: Assessment and Evaluation in Integrated Science – 2C

Organization and mounting of Integrated 'Science workshop assessment of practical work in integrated science, development of assessment grid for all domains cognition, affective and psychomotor. Assessment of manipulative skills using on – the – sport technique.

SED 401: Practice in Integration of Science- 3C

Concept of unity of science. Examination of the overlapping course content, concepts,' principles and generalization in Physics, Chemistry, 'Biology,' Earth Sciences,' Agricultural Science, Medical Science and Space Science.

SED 403: Nigerian industries and Industrialization- 3C

Science, Technology and industrial development. Requirements for industrial development – classification of industries. The Nigeria industrial growth model. Classification of locally manufactured industrial products. Industrial waste and associated ecological problem, the Nigeria experience Field trip to selected industries.

SED 404: Movement of Organism and Materials- 2E

The course deals with Biological control systems and movements of materials in living systems.

SED 411: Integrated Science Curriculum Design and Implementation- 3C

Principles and techniques of designing an Integrated Science Curriculum development with particular reference to Africa and

Nigeria input in Integrated Science curriculum design implementation and evaluation of the Curriculum.

SED 412: Cycles in Nature- 3C

Biological cycles and their significance; food webs etc. The carbon cycle, oxygen, carbon dioxide, nitrogen, water cycle, canoe, Photo Chemistry of the atmosphere entropy cant cycle, magnetic field, Lorentz forces geological cycle, tectonic cycle with particular reference to Africa and Nigeria. Geographical cycled of erosion in variant, the arid cycle, the protein association cycle the karat erosion cycle, the marine erosion cycle.

SED 414: Man Uses Energy III- 3E

The course deals with energy used by man as provided by physical properties of force, field and waves. The advantages and disadvantages derived by man through these physical properties.

SED 415; Graphical Methods in Science and Mathematics- 3

Techniques in constructing line Curricular and multiple bar charts, Histogram, pie chart and their uses.

MATHEMATICS EDUCATION

(b) Programme/Sub-Discipline Philosophy and Objectives Philosophy

(i) Philosophy

The Philosophy of Mathematics Education which is a sub-set of philosophy of Science Education in Delta State University is to produce suitably qualified manpower to teach Chemistry in Secondary Schools. The era of Information Communication Technology (ICT) has broadened the scope to application of computer in the teaching of Mathematics. The programme of Mathematics Educations is therefore structured to equip the students for effective performance of their duties in the instructional process and in classroom management. The students are to be exposed to the principles, practices and theories of teaching with special reference to Mathematics.

(ii) Objectives

The main objective of Mathematics Education Programme is to produce graduate teachers in Mathematics with sound academic and professional training Mathematics Education.

Specific objectives of the programme include to:

1. enable students to acquire the various concepts, principles, theories, laws and conceptional schemes of Mathematics.
2. enable students to acquire necessary teaching and practical skills and other aspects of methodology of teaching Mathematics;
3. help students to become effective classroom teachers;
4. expose students to industrial application of Mathematics;
5. acquire the ethnics of teaching as a profession;
6. become professional science teachers;
7. disseminate information in Mathematics Education to the society;
8. develop necessary laboratory skills and;

9. develop positive values and attitudes for the efficient discharge of their duty as teachers.

(a) Admission Requirements

(1) UME Entry

Candidates are expected to obtain SSC O' level with credit passes in at least five subjects including English Language, Mathematics, Chemistry or Physics.

(2) DIRECT ENTRY

Candidate must have at least merit passes in Mathematics at N.C.E and Education.

(b) Programme Structure

The B.Sc (Ed) degree programme has four-year and three-year duration for UME and Direct Entry students respectively. The courses in 100, 200 and 300 levels are designed to equip the students with fundamental knowledge of science, Mathematics and skills in teaching. They also take general courses like GST and other elective courses from any of the teaching subject areas approved by the Department. At 400 level, in addition to Mathematics Education courses, students carry out research works (projects) on an approved topics. The project which is supervised by a lecturer in the Department is also defended before a panel of lecturers in the Department.

B.Sc (Ed) Degree in Mathematics

100 Level – First Semester Courses

Course code		Course Titles	Units
EDU	100	Introduction to Teaching Profession	2C
EDU	101	Foundations of Education	2C
GST	101	Use of English and Library	4C
GST	102	Logic, Philosophy and Human Existence	2C
MTH	101	Elementary Mathematics I (Algebra & Trig.)	3C
MTH	102	Elementary Mathematics II (Calculus)	3C
CHM	101	General Chemistry I	3E
PHY	101	General Physics I (Mech, Thermal Physics and Waves)	2E
TOTAL (Cores = 16, Electives = 5)			**21 units**

100 Level – Second Semester Courses

Course code		Course Titles	Units
GST	111	Nigeria Peoples and Culture	2C
GST	113	Peace Studies and Conflict Resolutions	2C
GST	112	History and Philosophy of Science	2C
MTH	111	Elementary Mathematics III	3C
MTH	112	Statistics for Science and Engineering	3C
SED	111	Science, Technology and Society	2C
EDU	114	Introduction to Language Education	2E
PHY	111	General Physics III (Electricity, Magnetism and Modern Physics)	3E
PHY	112	General Physics Laboratory II	2E
TOTAL (Cores = 14, Electives = 7)			**21 units**
		Grand Total	**42 Units**

200 Level – First Semester Courses

Course Code		Course Title	Units
EDU	200	Principles of Instruction	2C
EDU	201	Philosophy of Education	2C
EDU	202	Curriculum Theory and Development	2C
EDU	203	Micro Teaching (Teaching Skills)	2C
CSC	200	Introduction to Computer	2C
MTH	201	Mathematical Method I	3C
MTH	202	Linear Algebra I	3C
MTH	203	Probability Theory	3C
MTH	204	Real Analysis I	3C
CSC	202	Computer Programming I (Object Oriented Programming)	3E
SED	204	History and Philosophy of Mathematics	2E
TOTAL (Cores = 20, Electives = 7)			**27 units**

200 Level – Second Semester Courses

Course code		Course Title	Units
EDU	211	Special Methods of Teaching	2C
EDU	212	Test and Measurement	2C
CES	211	Entrepreneurship and Innovation	2C
MTH	211	Sets, Logic and Algebra	3C
MTH	212	Linear Algebra II	3C
MTH	213	Introduction to Numerical Analysis	3C
MTH	221	Mathematical Method II	3C
SED	215	Science Education Methods	2E
MTH	214	Vector Analysis	2E
TOTAL (Cores = 18, Electives = 4)			**22 units**
		Grand Total	**49 Units**

300 Level – First Semester

Course Code		Course Title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration and Planning	2C
EDU	302	Educational Technology	2C
MTH	301	Abstract Algebra I	3C
MTH	302	Real Analysis II	3C
MTH	303	Complex Variable I	2C
MTH	304	Differential Equation II (Advanced Calculus)	3C
MTH	307	Introduction to Mathematical Modeling	3C
EDU	305	Educational Statistics	2E
MTH	305	Vector and Tensor Analysis	3E
TOTAL (Core = 21, Elective = 5)			**26 units**

300 Level – Second Semester

Course Code		Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Method and Data Processing	2C
EDU	313	ICT in Education	2C
CES	311	Entrepreneurship Studies (Business Creation and Growth)	2C
MTH	311	Abstract Algebra II	3C
MTH	313	Metric Space Topology	3C
MTH	316	Complex Analysis II	3C
MTH	317	Mathematical Method III	3C
SED	312	School Science Laboratory	2E
TOTAL (Core = 20, Elective = 2)			**22 units**
		Grand Total	**48 Units**

400 Level – First Semester Courses

Course Code		Course Title	Units
EDU	401	Practical Teaching	3C
EDU	402	Guidance and Counselling	2C
EDU	404	School Administration and the Law	2C
SED	407	Seminar	2C
MTH	401	Theory of Ordinary Differential Equation	3C
MTH	308	Introduction to Operational Research	3C
MTH	309	Sampling Theory	3E
MTH	402	Modules	3E
Total (Core = 15, Elective = 6)			**21units**

400 Level Second Semester

Course Code		Course Title	Units
EDU	410	Research Project	6C
EDU	411	Special Education	2C
MTH	411	Theories of Partial Differential Equation	3C
MTH	412	Functional Analysis	3C
MTH	413	Lesbexque Measure and Integration	3C
EDU	413	Adolescent Psychology	2E
Total (Core = 17, Elective = 2)			**19 Units**
		Grand Total	**40 Units**

Old

300 Level – First Semester

Course Code	Course Title	Units
EDU 300	Teaching Practice	3C
EDU 301	Introduction to Educational Administration and Planning	2C
EDU 302	Educational Technology	2C
EDU 303	Childhood Education	2E
EDU 304	Rural Education	2E
EDU 305	Educational Statistics	2E
MTH 301	Abstract Algebra	3C
MTH 302	Real Analysis III	3C

MTH 303	Complex Analysis	3E
MTH 304	Differential Equation II	3C
MTH 305	Vector and Tensor Analysis	3C
MTH 307	Introduction to Mathematical Modeling	3C
	TOTAL (Core = 19, Elective = 9)	**28 Units**

300 Level – Second Semester

Course Code	**Course Title**	**Units**
EDU 311	Educational Psychology	2C
EDU 312	Research Method and Data Processing	2C
EDU 313	ICT in Education	2E
EDU 315	Introduction to Economics Education	2E
EDU 314	Emergent Problems in Nigeria Education	2E
MTH 311	Abstract Algebra II	3C
MTH 312	Real Analysis IV	3C
MTH 313	Metric Space Topology	3C
MTH 314	Probability Theory II	3E
MTH 315	Statistical Interference II	3E
MTH 317	ICT in Science Education	2C
SED 318	Curriculum Implementation	2E
CES 311	Business Creation and Growth	0C
	TOTAL (Core = 15, Elective = 14)	**29 Units**

Old

400 Level – First Semester Courses

Course Code	Course Title	Units
EDU 401	Practical Teaching	3C
EDU 402	Introduction to Guidance and Counselling	2C
EDU 403	Continuous Assessment	2E
EDU 404	Education Law	2E
EDU 405	Sociological Theory	2E
EDU 406	Curriculum Innovation and Revision	2E
MTH 401	Ordinary Differential Equation	3C
MTH 402	Modulus	3C
MTH 308	Introduction to Operation Research	3E
MTH 309	Sampling Theory	3E
SED 407	Seminar	2C
Total (Core = 13, Elective = 14)		**27 Units**

400 Level Second Semester

Course Code	Course Title	Units
EDU 411	Org. and Administration of Prim. & Sec. Edu.	2C
EDU 412	Comparative Education	2C
EDU 413	Adolescent Psychology	2E
EDU 410	Research Project	4C
MTH 412	Functional Analysis	3C
MTH 413	Lesbexque Measure and Interrogation	3C
MTH 316	Complex Analysis II	3E
MTH 317	Mathematical Methods II	3C
Total (Core = 17, Elective = 5)		**22 Units**

MATHEMATICS

MTH 101: Elementary Mathematics I (Algebra and Trigonometry) - 3C

Elementary set theory's; subjects, union, intersections, complements. Venn diagrams. Real numbers, integers, rational and irrational numbers. Mathematical induction, real sequences and series, theory of quadratic equations, binomial theorem. Complex numbers; algebra of complex numbers, the Argand Diagram, De-Moivre's theorem, nth roots of unity. Circular measures, trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH 102: Elementary Mathematics II (Calculus) -3C

Functions of a real variable, graphs, limits and idea of community. The derivative form first principles, as limit of rate of change. Techniques of differentiation. Extreme values, curve sketching; integration as an inverse of differentiation. Methods of integration. Definite in integrals. Applications to areas, volumes.

MTH 111: Elementary Mathematics III -3C

Geometric representation of vectors in 2 3 dimensions, components and direction cosines, additional and scalar multiplication of vectors, linear independence, scalar and vector products of two vectors. Differentiation and integration of vector with respect to a scalar variable. Two dimensional coordinate geometry. Straight lines, circles, parabola, ellipse and hyperbola tangents and normals. Kinematics of a particle moving in a plain. Force momentum, law of motion, gravity, projectiles, resistance, vertical motion. Angular momentum, simple harmonic motion, elastic strings, simple pendulum, impulse. Impact of two smooth spheres and of a sphere on a smooth surface.

MTH 112: Statistics for Physical Sciences and Engineering -3C

Arrays tables and charts, simple and grouped data: measures of centrality and dispersion: Mean, Mode, Median, Range, Mean

Deviation, Variance, Standard Deviation, coefficient of variation, skewness, kurtosis and quantiles, elements of probability theory, probability distribution: normal, binomial and poisson. Regression and correlation.

MTH 200: Introduction to Computer Science (3units)
History of computers, functional components of computers, characteristics of a computer, problem solving; flow charts. Algorithms, computer programming; statements symbolic names, arrays, subscripts expression and control statements. Data representation: binary, octal and hexadecimal arithmetic, compliments. Introduction to BASIC or FORTRAN programming language, computer application/system software.

MTH201: Mathematical Methods I- 2C
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 and lagrange multipliers. Increments, differentials; and linear approximations. Evaluation of line, integrals and multiple integrals.

MTH 202: Linear Algebra I -3C
Vector spaces over the real field. Subspaces, linear independence, basis and dimensions. Linear transformations and their representation by matrices range, null spaces and rank, singular transformation matrices, Algebra of matrices, set theory.

MTH 203: Probability Theory I – 3C
Combinatorial analysis. Probability models for the study of random phenomena, sample spaces. Probability distribution of discrete and continuous random variables with examples. Expectations. Chebychev's inequality.

MTH 204: Real Analysis I- 3C

The real number system. Bounded sets of real numbers. Convergence of sequences of numbers. Monotone sequences/series of real numbers. The theorem of nested intervals, Cauchy sequences. Tests for convergence of series. Absolute and conditional convergence of series. Re-arrangements. Mappings and functions of mean value theorems. Taylor's theorems. Maclaurin's.

MTH211: Sets, Logic and Algebra-3C

Introduction to the language and concepts for modern mathematics. Basic set theory, mappings, relations, equivalence another relations Cartesian products. Binary logic methods of proof. Binary operations. Algebraic structures; semi groups, groups, rings, integral domain and field. Homomorphisms. Number systems; properties of integers, rationals, real and complex numbers. Pre-requisite MTH 101.

MTH212: Linear Algebra II – 3C

Systems of linear equations, changes of basis, equivalence and similarity. Eigenvalues and eigenvectors. Minimum characteristics polynomials of linear transformations (Matrix). Cayley-Hamilton theorem. Bilinear and quadratic forms. Orthogonal, diagonal, diagonalisation. Canonical forms. Pre-requisite MTH 101, MTH 102.

MTH 213: Introduction to Numerical Analysis- 3C

Solution of algebraic and transcendental equations. Curve fitting. Error analysis. Interpolation and approximation. Zeros of non-linear equations in one variable. Systems of linear equations. Numerical differential and integral Quadrature; Initial value problems for ordinary differential equations.

MTH 301: Abstract Algebra I- 3C

Groups, definition, examples including permutation groups. Subgroups, Cosets, Lagrange's theorem and application. Cyclic groups, rings, definition, examples including Z and Z/n, rings of

polynomials and factorization, Euclidean algorithms for polynomials H.C.F. and L.C.M. of polynomials.

MTH302: Real Analysis II – 3C

Double limits. Double sequences and series. Limits continuity of functions of several variables. Derivations of several variables. Taylors theorem. Inverse functions and implicit function theorems.

MTH 303: Comp1ex Variable I – 2C

Functions of a complex variable. Limits and continuity of functions of a complex variable. Derivatives. The Cauchy Riemann equations. Analytic functions. Bilinear transformations. Conformal mappings, convergence of sequences and series of functions of a complex variable.

Power series. Taylor series.

MTH 304: Differential Equations II (Advanced Calculus) – 3C

Series solutions of second order linear equations. Bessel, Legendre and hypergeometric equations. Gamma and Beta functions, Sturm-Liouville problems. Orthogonal polynomials and functions. Fourier, Fourier-Bessel and Fourier-Legendre series. Expansion in series of orthogonal functions. Fourier transformations. Solution of Laplace equation, wave equation and heat equations by Fourier transformations. Solutions of Laplace equation, wave equation and heat equations by Fourier method. Pre-requisite MTH 205, 201

MTH 305 Vector and Tensor Analysis- 3E

Vector algebra. Dot and Cross Products. Equations of curves and surfaces, Vector differentiation and applications Gradient divergence and curl, Vector integration line, surface and volume integrals. Green's Stoke's and divergence theorem of Gauss. Tensor products of vector spaces. Tensor algebra. Symmetry Cartesian tensors. Pre-requisite MTH 201

MTH 307: Introduction Mathematical Modeling (3 Units)
Methodology of model building; identification, formulation and solution of problems. Cause-effect diagrams. Equation types-algebraic ordinary differential, partial differential, difference integral and functional equations. Applications of Mathematics Models to Physical, Social and Behavioural Sciences. Pre-requisites MTH201.

MTH 309: Sampling Theory – 3E
Basic Sampling Methods, Multistage Sampling, Planning and Designs Survey, Data Collection and Analysis. Quality Control Techniques, Use of Control Charts, Sequential Sampling Plans. Process Control and Product Control, Tolerance Limits

MTH 311: Abstract Algebra II – 3C
Normal subgroups and quotient groups. Isomorphism theorem. Cayley's theorems. Direct products. Group of small order. Groups acting on sets, Sylow theorems. Ideal and quotient rings. P.1.D's, U.F.D.'s Euclidean rings. Irreducibility.

MTH313 Metric Space Topology- 3C
Sets, Metrics and examples; Balls; open sets and neighbourhoods; closed sets; interior, exterior, limit points and closure of sets. Dense subsets and separable spaces, convergence in metric space. Homomorphism, continuity, compactness and connectedness.

MTH 316: Complex Analysis II- 3C
Integration. Curve Jordan curve theorem; Riemann Integration along smooth curves. Cauchy theorem (proof for any closed polygon) and consequences e.g. Cauchys integral formulae and related theorems, Morera's theorem Cauchy's inequality, singularities, Laurent expressions and theory of Residues. Residue series. Maximum modulus principles. The Argument theorem, Rouche's theorem, the fundamental theorem of Algebra. Principles

of analytic continuation. Multiple valued functions and Riemann surfaces. Pre-requisite MTH303.

MTH 317: Mathematical Methods III- 3C
Special operators, Hermittan, Projection and unitary operators. Eigenvalues and eigenvectors. Use of the net and bra-notation. Infinite dimensional vector spaces: the classical orthogonal polynomials (Legendre, Hermite and Laguerre Polynomials). Rodrigue's formula. Special functions gamma, and Beta functions. Bessel functions. Elementary properties of the hypergeometric functions. Detailed treatment of multiple integrals. General theory of operators diagonalization of operators. Special theory of function operators. Integral and differential operators. Pre-requisite MTH 201.

MTH 401: Theory of Ordinary Differential Equations- 3C
Sturm's separation and comparison theorems. Semi-polya theorems. Existence and uniqueness of solutions of systems of ordinary differential equations. Theory and properties of their solutions. Stability and phase portraits of systems. Floquet's theorem for periodic linear systems. Pre-requisite MTH 304

MTH 402: Modules- 3E
Modules special classes of modules. Submodules of free modules. Decomposition theorems. Application of decomposition theorems. Finitely generated abelian groups. Linear transformation matrices and, canonical forms. Computation of canonical forms. Pre-requisite MTH301.

MTH 408: Introduction to Optimization Research II- 3C
Non linear programming simple and multi-variance optimization, integer programming, Branch and bound methods in programming problems. Decomposition of large programming problems. Gradient methods, Kuhn-Tucker conditions. Optimization of functional with integral and differential constraints. Optimization of stated systems.

Dynamic inventory system. Inventory models with special cost assumption, Markovian decision processes. Optimization under uncertainty and risk. Pre-requisite MTH331.

MTH 412: Functional Analysis- 3C

Definition and examples of normed linear spaces, continuity of linear transformations, compactness and separability of linear spaces. Elements of Banach and Hilbert spaces. Properties of operators open mapping and closed graph theorems. Dual spaces. Hahn Banach theorems and Riesz representation theorem.

MTH413: Lebesgue Measure and Integration- 3C

Lebesgue measure. Measureable and non functions; Lebesgue integral; Integration of non function the general integral convergence theorems. Pre-requisite MTH304, 215.

PHYSICS EDUCATION

(b) Programme/Sub-Discipline Philosophy and Objectives

Philosophy

(i) Philosophy

The Philosophy of Physics Education which is a sub-set of philosophy of Science Education in Delta State University is to produce suitably qualified manpower to teach Physics in Secondary Schools. The era of Information Communication Technology (ICT) has broadened the scope to application of computer in the teaching of Physics. The programme of Physics Education is therefore structured to equip the students for effective performance of their duties in the instructional process and in classroom management. The students are to be exposed to the principles, practices and theories of teaching with special reference to Physics.

(ii) Objectives

The main objective of Physics Education Programme is to produce graduate teachers in Physics with sound academic and professional training in Physics Education. Specific objectives of the programme include to:

1. enable students to acquire the various concepts, principles, theories, laws and conceptional schemes of their relevant subjects;
2. enable students to acquire necessary teaching and practical skills and other aspects of methodology of teaching their subjects;
3. help students to industrial applications of their subjects;
4. expose students to industrial applications of their subjects;
5. acquire the ethnics of teaching as a profession;
6. become professional science and mathematics teachers;
7. disseminate information in Physics Education to the society;
8. develop necessary laboratory skills and;
9. develop positive values and attitudes for the efficient discharge of their duty as teachers.

(i) Admission Requirements

(1) UME Entry

Candidates are expected to obtain SSC O' level with credit passes in at least five subjects including English Language, Mathematics and Physics.

(2) DIRECT ENTRY

Candidate must have at least merit passes in Physics and either Chemistry or Education or any other subject, or GCE 'A' level passes including Physics.

(3) Programme Structure

The B.Sc (Ed) degree programme has four-year and three-year duration for UME and Direct Entry students respectively. The courses in 100, 200 and 300 levels are designed to equip the students with fundamental knowledge of science, Physics and skills in teaching. They also take general courses like GST and other elective courses from any of the teaching subject areas approved by the Department. At 400 level, in addition to Physics Education courses, students carry out research works (projects) on an approved topics. The project which is supervised by a lecturer in the Department is also defended before a panel of lecturers in the Department.

B.Sc (Ed) Degree in Physics

100 Level First Semester

Course Code		Course Title	Units
EDU	100	Introduction to Teaching Profession	2C
EDU	101	Foundations of Education	2C
GST	101	Use of English and Library	4C
GST	102	Logic, Philosophy and Human Existence	2C
PHY	101	General Physics I (Mech. & Thermal Physics and Waves)	3C
MTH	102	Elementary Mathematics II (Calculus)	3C
MTH	101	Elementary Mathematics I (Algebra & Trigonometry)	3C
		Total (Core = 19, Elective = 0)	**19units**

100 Level Second Semester

Course Code		Course Title	Units
GST	111	Nigerian Peoples and Culture	2C
GST	112	History and Philosophy of Science	2C
GST	1 13	Peace Studies & Conflict Resolution	2C
PHY	111	General Physics II (Electricity, Magnetism & Modern Physics)	3C
PHY	112	General Physics Laboratory	2C
SED	111	Science Technology & Society	3C
MTH	112	Statistics for Science & Engineering	3C
EDU	114	Introduction to Language Education	2E
		Total (Core = 16, Elective = 2)	**18 units**
		Grand Total	**37 Units**

200 Level First Semester

Course Code		Course Title	Units
EDU	200	Principles of Instruction	2C
EDU	201	Philosophy of Education	2C
EDU	202	Curriculum Theory and Development	2C
EDU	203	Micro Teaching (Teaching Skills)	2E
CSC	200	Introduction to Computer	2C
PHY	201	Elementary Modern Physics	3C
PHY	203	Elementary Physics I	2C
PHY	204	Thermal Physics	3C
SED	204	History & Philosophy of Physics	2C
MTH	201	Mathematics Methods I	3E
		Total (Core = 22, Elective = 5)	**23 units**

200 Level Second Semester

Course Code		Course Title	Units
EDU	211	Special Methods of Teaching	3C
EDU	212	Test & Measurement	2C
CES	211	Entrepreneurship and Innovation	2C
PHY	211	Vibration & Waves Optics	2C
PHY	212	Energy and Environment	2C
PHY	213	Experimental Physics II	2C
PHY	214	Electronics I	2C
PHY	216	Electricity-Circuits and Electronics	3C
MTH	212	Introduction to Numerical Analysis	2E
SED	215	Science Education Methods	2E
		Total (Core = 18, Elective = 2)	**21 units**
		Grand Total	**44 Units**

300 Level First Semester

Course Code		Course Title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Educational Administration and Planning	2C
EDU	302	Educational Technology	2C
PHY	301	Analytical Mechanics I	3C
PHY	302	Experimental Physics	2C
PHY	305	Quantum Physics	3C
PHY	306	Statistical and Thermal Physics	3C
PHY	307	Workshop Practice (Measurement and Instrumentation)	2C
		Total (Core = 20, Elective = 2)	**22 units**

300 Level Second Semester

Course Code		Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Methods & Data Processing	2C
EDU	313	ICT in Education	2C
CES	311	Business Creation and Growth	2C
PHY	311	Analytical Mechanics II	3C
PHY	312	Electromagnetic Waves and Optics	3C
PHY	313	Solid State Physics	3C
PHY	316	Atomic Physics	2C
SED	312	School Science and Laboratory	2E
SED	318	Curriculum Implementation and Evaluation	2E
		Total (Core = 19, Elective = 4)	**23 units**
		Grand Total	**45 Units**

400 Level First Semester

Course Code		Course Title	Units
EDU	401	Practical Teaching	3C
EDU	402	Guidance & Counselling	2C
EDU	404	School Administration and the Law	2C
PHY	401	Quantum Mechanics I	3C
PHY	402	Mathematical Method for Physics I	3C
PHY	403	Solid States of Physics II	3C
PHY	405	Computational Physics	3C
SED	407	Seminar	2C
EDU	406	Curriculum Innovation and Revision	2E
		Total (Core = 21, Elective = 2)	**23 units**

400 Level Second Semester

Course Code		Course Title	Units
EDU	410	Research Project	6C
EDU	411	Special Education	2C
PHY	411	Quantum Mechanics II	3C
PHY	417	Material Science	2C
PHY	431	Nuclear Physics I	2C
EDU	412	Comparative Education	2E
EDU	413	Adolescent Education	2E
		Total (Core = 15, Elective = 4)	**19 units**
		Grand Total	**42 Units**

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300 Level- First Semester Courses

Course Code		Course Title	Units
EDU	300	Teaching Practice	3C
EDU	301	Introduction to Education Administration & Planning	2C
EDU	302	Educational Technology	2C
EDU	303	Childhood Education	2E
EDU	304	Rural Education	2E
EDU	305	Educational Statistics	2E
PHY	302	Statistical Physics	3C
PHY	303	Experimental Physics III	2C
PHY	305	Electromagnetism	3C
PHY	307	Quantum Mechanics I	3C
Total (Core = 18, Elective= 6)			**24 Units**

300 Level- Second Semester Courses

Course Code		Course Title	Units
EDU	311	Educational Psychology	2C
EDU	312	Research Methodology & Data Processing	2C
EDU	313	ICT in Education	2E
EDU	314	Emergent Problems in Nigeria Education	2E
EDU	315	Introduction to Economics Education	2E
PHY	311	Electromagnetism II	3C
PHY	312	Solid State Physics I	3C
PHY	313	Experimental Physics II	2C
PHY	314	Quantum Mechanics II	3C
SED	317	ICT in Education	2C
SED	318	Curriculum Implementation and Evaluation	2E
Total (Core = 17, Elective = 8)			**25 Units**

400 Level- First Semester Courses

Course Code		Course Title	Units
EDU	401	Practical Teaching	3C
EDU	402	Introduction to Guidance & Counselling	2C
EDU	403	Continuous Assessment	2E
EDU	404	Education Law	2E
EDU	405	Sociological Theory	2E
EDU	406	Curriculum Innovation and Revision	2E
PHY	308	Mathematical Method for Physics	3C
PHY	403	Solid States of Physics II	3C
PHY	404	Nuclear Physics I	3C
SED	407	Seminar	2C
Total (Core = 16, Elective =8)			**24 Units**

300 Level- Second Semester Courses

Course Code		Course Title	Units
EDU	410	Research Project	4C
EDU	411	Org. and Administration of Prim. And See Education	2C
EDU	412	Comparative Education	2C
EDU	413	Adolescent Education	2E
MTH	317	Mathematical Methods	3C
PHY	417	Material Physics	3C
PHY	431	Nuclear Physics II	3C
Total (Core = 17, Elective =2)			**19 Units**

COURSE DESCRIPTION FOR PHYSICS EDUCATION

PHY 101: General Physics I (Mechanics) & Thermal Physics and Waves (3C)

Units and dimensions. Vector algebra. Particle kinematics: Displacement, velocity, acceleration; rectilinear motion. Newton's laws of motion, work, energy and power; conservation of energy and linear momentum; impulse; collisions. Uniform circular motion. Rotational motion; relation between equations of linear motion and rotational motion; conservation of angular momentum; moment of inertia. Hydrostatics; Archimedes's principle. Surface tension. Fluid flow and viscosity; Poiseuillc's law.

PHY 111: General Physics III (Electricity, Magnetism and Modern Physics) (3C)

Electric charges and fields, conductors and insulators; charging by friction and induction. Coulomb's law. Electric field and potential. Capacitors and dielectrics, Effects of dielectrics, Electric current, direct current circuits; Kirchhoff's laws. Magnetic fields of electric currents. Torques in magnetic field. Electron-magnetic Appliances, Ammeters and Voltmeters. Induced emfs; Faraday's and Lenz's laws. Self and mutual inductance. Alternating current.

PHY 112: General Physics Laboratory I (2C)

Laboratory experiments which involve the principles and experimental techniques in mechanics, mechanical properties of matter, heat and thermal properties, vibration and mechanical waves, optics, electricity and magnetism.

PHY 201: Elementary Modern Physics (3C)

Review of vector algebra. Kinematics: Motion of particles and rigid bodies in one, two and three dimensions using Cartesian, polar, cylindrical and spherical coordinates. Dynamics, Newton's laws. Conservative systems, central forces. Conservation laws. Gravitation.

Pre-requisite: PHY 101

PHY 204: Thermal Physics (3C)
D.C circuits, Kirchhoff's laws, sources of emfs and currents. Network analysis and circuit theorems. Transients: Growth and decay of currents. Alternating current theory: Sinuosoidal waveforms, peak values, power; impedance and admittance, RLC circuit, Q-factor, Pre-requisite: PHY 111.

PHY 211: Waves: Vibration and Wave Optics (2C)
Propagation of plan and circular pulses; reflection, refraction, fibre optics. Dispersion by prisms, relation between colour and wavelength. Formation of images, mirrors, lenses. Optical instruments: microscope, telescope. Defects of images: chromatic aberration, spherical aberration, etc, and their reduction.
Wave phenomena; Acoustic waves, the harmonic oscillator, wave on string energy in wave motion; longitudinal waves, standing waves; group and phase velocity. Doppler effect, Physical optics spherical waves, interference and diffraction, thin films; holography; dispersion, polarization and scattering.
Pre-requisites: PHY 101, PHY 102, MTH 111

PHY 212: Energy and Environment (2C)
Energy and power: principles, demands and outlook; transformation of energy and its cost, thermal pollution; electrical energy from fossil fuels, hydroelectric generation: principles and problems. Coals capacity, storage reserves, efficiency, environmental effects. Electrical energy from nuclear reactors: energy in the future, breeder reactors: fusion energy, solar energy, geothermal energy, tidal energy, etc Promise and problems. Course lecturers are to be supplemented with excursions.

PHY 213: Experimental Physics II (2C)
Experiments on waves, physical optics, energy, environment, modern physics and electronics.

PHY 214: Electronics I (2C)
Semiconductors, the p-n junction, semiconductor diodes. Transistors: bipolar transistors, field effect transistors; characteristics and equivalent circuits, amplifiers, feedback, oscillators.

PHY 216: Electricity-Circuits and Electronics
The earth's atmosphere: structure, chemical composition, types; heat transfer, radiative mechanism. A brief discussion of atmospheric thermodynamics; hydrostatic equilibrium conditions. Study of some model atmosphere; derivation of the equations of motion; energy relations. General circulation of the atmosphere; weather and its impact on Man. Introduction to atmospheric electricity.

PHY 301: Analytical Mechanics II (3 Units)
Newtonian mechanics: Motion of a particle in one, two and three dimensions, systems of particles. Collision theory, centre of mass frame and laboratory frames. Collision theory, centre of mass frame and laboratory frames; cross-section. Motion in a non-inertial reference frame; rotating co-ordinate system; the Coriolis force. Language equations; Generalized coordinates; Lagrange's and Hamilton's equations; equivalence of Newton's laws of motion. Conservation theorems, equations of motion in a central field. Dynamics of rigid bodies; inertia tensor, principal axes; Eulerian angles, Euler's equations for the motion of a rigid body.
Pre-requisite: PHY 201

PHY 302: Statistical Physics (3 Units)
Review of kinetic theory. Velocity and speed distribution functions, derivation and experimental verification of Maxwell's velocity distribution. Transport phenomena, viscosity, thermal conductivity, diffusion, the relaxation time approach. Statistical thermodynamics; basic ideas of probability and probability theory; energy states, the macro-and micro-states. Density of states, phase space. The

Liouville theorem. The equipartition theory; particle statistics, the optimal particle distribution in phase space; the Maxwell-Boltzmann distribution. Quantum statistics; statistical interpretation of entropy. Distribution functions and the partition functions. Application of quantum statistics to monatomic and diatomic gases. Linear oscillators, the blackbody radiation and the electron gas. Einstein's theory of specific of solids; Debye model.
Pre-requisite: PHY 202.

PHY 305: Quantum Physics (3C)
Electrostatics: Electric fields and potentials; potential theory, Green reciprocal theorems, method of images. Dielectrics, capacitance, energy. Steady currents in continuous media. Magnetostatics: magnetic fields of current systems, calculation of self-inductance and mutual inductance, energy in magnetic fields. Electromagnetic induction, displacement current; Maxwell's equations, plane wave solutions.
Pre-requisite: PHY 111.

PHY 306: Electronics II (3 Units)
Physics of semiconductors, application of selected semi-conductor devices, junction and bipolar transistor Physics; fundamentals of digital electronics; logic gates, Hardware building blocks, combination and sequential logic; mathematicallogic units, registers, memories, RAM, EPROMS, etc. Interfacing applications.
Pre-requisite: PHY 214.

PHY 307: Workshop and Thermal Physics (2C)
The inadequacy of classical physics, basic postulates of quantum theory; elements of wave mechanics, the uncertainty principle. Schrödinger's equation; statistical interpretation of wave function; exact solutions of the Schrödinger equation for some simple physical systems including harmonic oscillator and hydrogen-like atoms.
Pre-requisite: PHY 215

PHY 311: Analytical Mechanics II (3C)
Maxwell's equations, Pointing vector, propagation of electromagnetic waves, polarizations, reflection and refraction of electromagnetic waves; wave guides, transmission lines; resonant cavities. Retarded and advanced potentials. Radiation of electromagnetic waves.
Pre-requisite: PHY 305

PHY 312: Electromagnetic Waves and Optics (3C)
Crystal structure, diffraction, Bragg's condition. X-ray scattering, reciprocal lattice, crystal binding and mechanical properties, ionic, covalent and metal crystals, defects in crystals, effects of defect on physical properties; lattice vibrations, elastic wave in cubic crystals, free election model, heat capacity; electrical and thermal conductivities. Pre-requisites: PHY 302, PHY 307

PHY 313: Solid State Physics (3C)
This is a continuation of PHY 303
Pre-requisites: PHY 203, PHY 213.

PHY 316: Atomic Physics (2C)
Review of atomic models of Thompson. Weakness of Rutherford model, Bohr model of the atom and the correspondence principle; X-ray spectra, Moseley law, X-ray energy levels. Selection and intensity rules; wave mechanics; the Schrödinger equation for a particle, and its solution for one dimensional system and the hydrogen atom. Selection rules, optical spectra and electronic structure, magnetic moment of the atom and the Stem-Gerlach experiment, magnetic moment of the electron, the Zeeman effect in terms of the vector model, Larmor procession, Lande' splitting factor. Paschen-Back effect; some properties of electromagnetic radiation.
Pre-requisite: PHY 214.

PHY 401: Quantum Mechanics I (3C)
Review of Lagrangian formalism, Hamilton's principle. Review of motion under central forces, equation of orbit. Planetary motion. Kepler's law, Rutherford scattering and stability of orbits. Hamiltonian formalism; canonical equation of motion, phase space and Liouville's theorem. Canonical transformation; Hamilton-Jacobi equation; Poisson brackets. Motion of charged particles in electromagnetic fields; motion of relativistic particles. Small oscillations. Continuous media.
Pre-requisite: PHY 301

PHY 402: Mathematical Method for Physics I (3C)
Elements of quantum theory of electromagnetic radiation; spontaneous and stimulated emission; Einstein's coefficients, absorption. Massers and lasers; theory, design, operation; holography. Fibre optics of solids, propagation of light in non-isotropic solids, electro-optic and magneto-optic effects. Interaction of light with matter, Raman and Rayleigh scattering.
Pre-requisite: PHY 304.

PHY 403: Solid State Physics II (3C)
Band theory of solids, electron motion in a periodic structure insulator and semi-conductors, holes and electrons effective mass of an electron. Hall effect in metals and semiconductors transport phenomena in metals; dielectric and optical properties of solids; electronic polarization and optical absorption magnetic properties of materials; magnetic resonance. Thermoelectric and galvanomagnetic phenomena. Fundamentals of superconductivity.

PHY 405: Computational Physics (3C)
Introduction to computer software languages and operation. Solution of algebraic and transcendental equations. Approximations and errors in computations. Solution of algebraic equations. Curve fitting. Matrix inversion. Eigenvalue equations. Fourier transforms.

Development of computer programs to implement some of the preceding methods Pre-requisite: MTH.

PHY 411: Quantum Mechanics II (3C)
Original investigation by the student leading to a dissertation. This course spans over the first and the second semesters and also involves active participation in Department seminars.

PHY 431: Nuclear Physics I (2C)
Nuclear reactions: Conservation laws; types of nuclear reactions, compound-nucleus reactions; cross sections, Breit-Wigner formula; direct reactions. Accelerators and ion sources; particle detection techniques and energy measurements. Nuclear spectroscopy. Neutron physics: Production and detection of neutrons; neutron sources; neutron activation. Fission; fission reactors. Fusion; fusion reactors.
Pre-requisite: PHY 403.

COURSE DESCRIPTION

GENERAL COURSES

CES 211: Entrepreneurship and Innovation- 2C

This course exposes the students to skills acquisition. It gives detail of students' development.

CES 311: Entrepreneurship Studies (Business Creation and Growth)- 2C

This course is a continuation of CES 211. It exposes the students to skills acquisition. It gives detail of students' development.

CSC 200: Introduction to Computer Science – 3C

History of computers, functional components of computers, characteristics of a computer, problem solving; flow charts. Algorithms, computer programming; statements symbolic names, arrays, subscripts expression and control statements. Data representation: binary, octal and hexadecimal arithmetic, compliments. Introduction to BASIC or FORTRAN programming language, computer application/system software.

EDU 100: Introduction to Teaching Profession – 2C

The meaning of education, characteristics of the effective teaching, the role of the teacher in contemporary society, teaching as a profession, obstacles to full professionalization of teaching In Nigeria, professional code of ethics for teachers in Nigeria, the national policy on education and the teaching profession in Nigeria, the Nigerian union of teachers (N. U. T.), the status of teachers in Nigeria, the school and community relationship, teaching practice for student teachers, supervision and evaluation of teaching practice, Teachers Registration council and principles of professionalization of teaching in Nigeria. Teachers right and responsibilities.

EDU 101: Foundations of Education - 2C

This course intends to serve as bedrock for teachers of education and first course for professional teacher preparation. It describes clearly and simply current education as exemplified by Greek and Roman education, the African system of education, the coming of western and Muslim education to Nigeria. Union of teachers as a small association to the largest workers union in Nigeria.

EDU 200: Principles of Instruction – 2C

The concept of teaching and learning, relationship between teaching and learning, teaching skills, general principles of teaching and learning, the effective teacher, key characteristics of effective teaching, educational aims, goals, purposes, and objectives. Taxonomy of educational objectives in the cognitive domain, effective domain, psychomotor domain, teaching methods, factors influencing teaching method, instructional material, lesson note, concept of lesson planning, syllabus, the scheme of work, classroom management.

EDU 201: Philosophy of Education - 2C

This course intends to search out for a general understanding of values and reality by chiefly speculative rather than observational means. It is a comprehensive system of ideas about human nature and the nature of reality: since all aspect of human life are influenced and governed by philosophical considerations.

EDU 202: Curriculum Theory and Development— 2C

Fundamental concepts of Curriculum development to include objectives, contents, learning opportunities and evaluation. Knowledge and skills on curriculum development.

EDU 203: Micro-Teaching – 2C

The course offers electronic to design process application and effect of techniques in teaching situation. To broader students' knowledge

on the systematic production, effective use and evaluation of instructional materials.

EDU 211: Subject Methods — 2C
The techniques of teaching different subjects will be involved. The different methods of teaching such as lecture method, oral-presentation or drama will also be involved among

EDU 212: Test and Measurement 2C
An experience in test construction, administration, analysis and interpretation.

EDU 301: Introduction to Administration and Planning – 2C
This course is an introductory aspect of educational administration; its meaning and scope of administration and management. It reflects current knowledge and theories in educational administration and it is intended to contribute to the effective administration of schools and related organizations. It presents an overview of educational administration and discusses the concept of theory, research and practice, leading to an examination and a critical analysis of the various schools of management thought.

EDU 302: Educational Technology – 2C
The course offers an elastic approach to the design process, application an effect of technology in the teaching/learning situation. It is designed to broaden students' teachers' knowledge on the systematic production, effective use and evaluation of inexpensive and local materials for instructional purposes.

EDU 311: Educational Psychology- 2C
This course examines psychology in education.

EDU 312: Research Methods and Data Processing- 2C
This course examines research method and data processing as it relates to Education

EDU 313: ICT in Education – 2C
As noted by the title this course examines the impact of the information and communication technology on education.

EDU 401: Practical Teaching – 3C
This course like EDU 300 is geared towards acquainting prospective teachers (education students) with the classroom teaching experience.

EDU 402: Guidance and Counselling -2C
This course is an introduction to guidance and counseling. It emphasizes counseling psychology: Its meaning, role and effects.

EDU 403: Continuous Assessment – 2E
This course examines continuous assessment and its effect on the overall performance of the students.
EDU 404: Educational Administration and Law- 2C
The course examines laws guiding school administration.

EDU 406: Curriculum Innovation and Revision — 2E
Knowledge on the process of curriculum revision improvement, change and innovation. The roles of participants and goals of curriculum change and innovation.

EDU 410: Research Project – 6C
This course is a practical course that involves students making research works and field work in education and its related discipline.

EDU 411: Special Education -2C
This is a continuation of EDU 301. This section of the course is intended to prepare students for active and intelligent participation in school organization and management. Emphasis is placed on the practices, day to day issues and problems of school administration.

EDU 412: Comparative Education – 2C

This course is an introductory aspect of educational system of various nations both developed and developing countries by way of comparison. Although the section of both developed and African countries was subjective, the uniqueness of and difference between the countries as well as the experiences of the contributions were taken into consideration.

EDU 413: Adolescent Psychology – 2E

This course emphasizes the psychology of adolescence.

GST 101: Communication in English - 4C

Effective communication and writing in English, Language skills, writing of essay answers, Comprehension, Sentence construction, Outlines and paragraphs, Collection and organization of materials and logical presentation, Punctuation. Brief history of libraries, Library and education, University libraries and other types of libraries, Study skills (reference services). Types of library materials, using library resources including e-learning, e-materials; etc, understanding library catalogues (card, OPAC etc) and classification, copyright and its implications, Database resources, Bibliographic citations and referencing.

GST 102: Logic Philosophy and Human Existence- 2C

A brief survey of the main branches of Philosophy Symbolic Logic Special symbols in symbolic Logic-conjunction, negation, affirmation, disjunction, equivalent and conditional statements law of tort. The method of education using rules of inference and bi-conditionals qualification theory. Types of discourse, Nature or arguments, Validity and soundness; Techniques for evaluating arguments; Distinction between inductive and deductive inferences; etc. (Illustrations will be taken from familiar texts, including literature materials, Novels, Law reports and newspaper publications).

GST 111: Nigerian People and Culture- 2C

Study of Nigerian history, culture and arts in pre-colonial times, Nigerian's perception of his 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 Environmental problems.

GST 112: History and Philosophy of Science-2C

Man-his origin and nature, Man and his cosmic environment, Scientific methodology, Science and technology in the society and service of man, Renewable and non-renewable resources-man and his energy resources, Environmental effects of chemical plastics, Textiles, Wastes and other material, Chemical and radiochemical hazards. Introduction to the various areas of science and technology. Elements of environmental studies.

GST 113: Peace Studies and Conflict Resolution-2C

Basic Concepts in peace studies and conflict resolution, Peace as vehicle of unity and development, Conflict issues, Types of conflict, e.g. Ethnic/religious/political/economic conflicts, Root causes of conflicts and violence in Africa, Indigene/settler phenomenon, Peace-building, Management of conflict and security. Elements of peace studies and conflict resolution, Developing a culture of peace, Peace mediation and peace-keeping, Alternative Dispute Resolution (ADR). Dialogue/arbitration in conflict resolution, Role of international organizations in conflict resolution, e.g. ECOWAS, African Union, United Nations, etc.

GST 114: Communication in French – 2C

Introduction to French, Alphabets and numeric for effective communication (written and oral), Conjugation and simple sentence construction based on communication approach, Sentence construction, Comprehension and reading of simple texts.