

**UNIVERSITY OF NIGERIA, NSUKKA**



**FACULTY OF EDUCATION  
DEPARTMENT OF SCIENCE EDUCATION  
POST-GRADUATE HANDBOOK**

**2018**

### LIST OF ACADEMIC STAFF

S/N	Names	Designation	Qualifications	Area of Specialization	Phone Number
1	Prof. J. C Adigwe	Professor	NCE (1975), B.Sc. (1979), M.Ed. (1982), Ph.D (1987), PGCEE (1990)	Chemistry Education	08063877572
2	Prof. B. G. Nworgu	Professor	NCE (1979) B.Sc. (1982) M.Ed (1985) Ph.D (1990)	Measurement & Evaluation	08039090211
3	Prof. U. M. Nzewi	Professor	NCE (1977) B.Sc.(1982) M.Ed. (1985) Ph.D (1990)	Biology Education	08037229254
4	Prof. D. N. Ezeh	Professor	NCE (1979) B.Sc. (1982) M.Ed (1987) Ph.D (1992)	Chemistry Education	08066751439
5	Prof. U. N. V. Agwagah	Professor	B.Sc (Ed.) (1981) M.Ed (1985) Ph.D (1993)	Mathematics Education	08035476704
6	Prof. A. A. Nwosu	Professor	B.Sc. (1977) PGDE (1980) M.Ed (1983) Ph.D (1991)	Biology Education	08037748569
7	Prof. N. Onyegegbu	Professor	B.Sc. (1978) PGDE (1982) M.Ed (1988) Ph.D (1999)	Biology Education	08033674495
8	Prof. Z. C. Njoku	Professor	B.Ed (1982) M.Ed (1990) Ph.D (1998)	Chemistry Education	08035811170
9	Prof. C. R. Nwagbo	Professor	B.Sc.(Hon)(1981) PGDE (1986) M.Ed (1989) M.Ph. (1995) Ph.D (1998)	Biology Education	08037537133
10	Prof. B. C. Madu	Professor	B.Sc. Ed. (1981) M.Ed (Sc.) (1986) Ph.D (2004)	Measurement & Evaluation	08057252877 07067840516
11	Prof. L. N. Nworgu	Professor	B.Sc. (1986) M.Ed (1992) Ph.D (2004)	Biology Education	08033874800

12	Dr. F. O. Ezeudu	Reader	NCE (1981) B.Sc. (1984) M.Ed (1988) Ph.D (1995)	Chemistry Education	08036755414
13	Dr. N. J. Anyaegbunam	Reader	B.Sc. (Ed) (1985) M.Ed (1989) Ph.D (2012)	Measurement & Evaluation	08033691907
14	Dr. Ebere Ibe	Lect. I	B.Sc. (1995) M.Ed (2004) Ph.D (2013)	Biology Education	08032667106
15	Dr. J. J. Agah	Lect. I	B.Sc. (Ed) (1998) M.Ed, (2006) Ph.D. (2016)	Measurement & Evaluation	08058562554
16	Dr. E. U. Okorie	Lect. I	NCE, (1980) B.Sc. (Ed) (1984) M.Ed (1986) Ph.D (2014)	Chemistry Education	08055438845
17	Dr. C. S. Ugwuanyi	Lect. I	NCE (2003) B.Sc. (2008) M.Ed (2011) Ph.D (2016)	Measurement & Evaluation	08063744826
18	Dr. C.C. Ugwuanyi	Lect. I	NCE (1993) B.Sc.(Ed) (1997) M.Ed (2009) Ph.D (2015)	Mathematics Education	08064241474
19	Dr. C.N. Obi	Lect. II	NCE (1980) B.Sc. (Ed) 1995 M.Ed (2006) Ph.D (2014)	Mathematics Education	08105383390

## **BIOLOGY EDUCATION PROGRAMME**

### **PHILOSOPHY**

Considering the role of Science, Technology and Mathematics in the social and economic advancement of a nation, the necessity to train high level human power in Science Education cannot be over emphasized. The philosophy of postgraduate programme in Biology Education is the development of high level professional educators/teachers who are able to participate in human capital development of the nation as managers of educational institutions, researchers, and Science Education leaders. The M.Sc/Ph.D programmes in Biology Education are specifically designed to enhance the quality of Biology Teachers and Educators towards the actualization of this philosophy.

### **OBJECTIVES OF THE PROGRAMME**

Generally, the programmes are designed to prepare holders of First/Masters Degrees in Biology Education and related disciplines who would provide effective leadership in research and teaching at different levels of education and training.

Specifically, the M.Sc/Ph.D (Biology Education) programmes are designed to achieve the following objectives:

- i. further development of professional expertise of students in Biology Education;
- ii. further development of knowledgeable scholars who would provide leadership in professional practice and intellectual competence in Biology Education at tertiary level;
- iii. further production of Biology Educators who are knowledgeable in and committed to the implementation of our national policy on Education at the tertiary levels;
- iv. further development of competent researchers in Education theory and practice in Biology for Nigeria's Education system;
- v. further production of Biology Educators who can propel social change through Education both intellectually in attitudes, skills, values, and world views;
- vi. produce Biology Educators who are committed to reform Educational delivery through effective application and utilization of ICT in both national and global contexts; and
- vii. Providing relevant intellectual capital in Biology Education for Nigeria and the rest

### **JOB OPPORTUNITIES:**

Successful graduates of the above programmes have ample teaching opportunities with various ministries of education, research institutes, Universities, Colleges of Educations, Polytechnics or private schools in Nigeria or elsewhere.

### **M.Sc (BIOLOGY EDUCATION)**

#### **BASIC ADMISSION REQUIREMENTS:**

The criteria for admission into the Master's programme (M.Sc (Ed) will be as follows:

- i. Candidates who hold Bachelor's degrees in Biology Education from an approved university must obtain a minimum of second Class (Honours) lower division with a CGPA of 3.5/5.0 for an academic programme.

- ii. Candidates who hold HND in Biology from approved polytechnics must in addition have a PGDE and obtain a minimum of Credit with a CGPA of 3.5.0 for an academic programme.
- iii. Evidence of NYSC discharge certificate or exemption/exclusion certificate is also required.
- iv. In addition, a candidate will undergo a screening exercise in the University and Department of Science Education

### **EXPECTED DURATION OF PROGRAMME**

- i. A full-time Academic Masters programme should run for a minimum of 4 semesters and a maximum of 6 semesters
- ii. Part-time Academic Master's programme should run for a minimum of six semesters and a maximum of 8 semesters,
- iii. For extension beyond the specified maximum period, a special permission of University Senate shall be required.

### **REQUIREMENTS FOR GRADUATION**

To be awarded a Master's degree in Biology Education candidate must pass a minimum of 36 units courses made up as follow:

- (i) Minimum core courses of 10 units
- (ii) Area of specialization minimum of 20 units
- (iii) M.Sc.(Ed) Research Project 6 units
- (iv) A student shall present at least one seminar, submit and defend a research dissertation
- (v) A student for Master's degree in Biology Education programme shall carry out research in a relevant area of specialization and submit an acceptable research dissertation (6 units) which must be defended before a panel of external and internal examiners.

<b>STRESS AREAS</b>	<b>Codes</b>
➤ Foundation Courses	0
➤ Issues/Trends	1
➤ Evaluation	2
➤ Innovation	3
➤ Curriculum	4
➤ Seminar	5
➤ Methods/Materials	6
➤ Research	9

## **MASTER'S DEGREE PROGRAMME IN BIOLOGY EDUCATION**

### **FIRST SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Unit</b>
RME 601	Research Methods in Education	2

PGC 601	Applications of ICT in Research Methodology	3
RME 603	Statistical Methods in Educational Research	3
EDS 641	Science Curriculum Development, Evaluation & Innovation.	3
EDS 605	Foundations of Science Education	2
EDU 613	Psychology of Learning	2
EDB 661	Methods and Material for Biology Instruction/Teaching	2

**OPTION A: PLANT SCIENCE (Take 6 Units)**

PSB 673	Techniques in Plant Ecology (* <i>Compulsory</i> )	3
PSB 665	Environmental Impact Assessment	3

**OR**

PSB 663	Concepts of Plant community	3
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**OPTION B: ZOOLOGY**

ZEB 623	Principles, Concepts and Problems in Parasitology and Public Health	3
ZEB 659	Ecosystem Management	3

**Total 23**

**SECOND SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Unit</b>
RME 604	Advanced Statistical Methods in Education	2
EDS 636	Science, Technology, Society and Development	2
EDB 618	Issues and Trends in Science Education	2
EDS 624	Science Education and Disadvantaged Groups	2

### **OPTION A: PLANT SCIENCES**

PSB 666	Ecosystems Pollution Ecology	3
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**Or**

PSB 668	Landscape Restoration Ecology	3
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### **OPTION B: ZOOLOGY**

ZEB 654	Ecology of Tropical Ecosystems	3
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Total		<b>11</b>
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## **SECOND YEAR**

### **THIRD AND FOURTH SEMESTERS**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Unit</b>
EDS 651	Graduate Seminar in Science Education	3
EDB 690	Research Project in Biology Education	6
<b>TOTAL</b>		<b>9</b>

### **Ph.D. BIOLOGY EDUCATION**

#### **Duration of Doctoral programme (after Master's degree)**

Full-time	A minimum of 6 semesters Maximum of 10 semesters
Part-time	A minimum of 8 semesters Maximum of 12 semesters

### **PhD PROGRAMME IN BIOLOGY EDUCATION (ZOOLOGY OPTION- ZOO)**

#### **First semester**

Course code	Course Title	Credit Unit
RME 701	Advanced Research method II	3
EDU 703	Information and communication technology (ICT) II	3
ZEB 721	Advances in Epidemiology, Public Health and Control of Parasitic Diseases	3
	OR	
ZEB 751	Advances in Protozoan , Molluscan and Arthropod Borne water Diseases	3
EDB 751	Ph.D seminar in Biology Education	3
PGC 701	Synopsis and Research grant writing	3
<b>Total</b>		<b>15</b>

### Second Semester

Course code	Course Title	Credit Unit	Credit Unit
RME 702	Advanced Educational statistics II	3	3
ZEB 722	Advances in Epidemiology, Public Health and Control of Parasitic Diseases.	3	
	OR		
ZEB 752	Advances in Ecosystem Management	3	3
EDB 752	Ph.D seminar II in Biology Education	3	3
<b>Total</b>		<b>9</b>	<b>9</b>

### Third-Fifth Semesters

Independent Study, Proposal, Field Study, Data Analysis and Report Writing

### SIXTH SEMESTER

Course code	Course Title	Credit Unit	Credit Unit
EDB 790	Ph.D Project in Biology Education	10	10

**Ph.D PROGRAMME IN BIOLOGY EDUCATION (PLANT SCIENCES OPTION - PSB)**



**First semester**

Course code	Course Title	Credit Unit
RME 701	Advanced Research method II	3
EDU 703	Information and communication technology (ICT) II	3
PSB 761	Topics in Plant Ecology/ Environmental Botany/Economic and Industrial Botany.	3
<b>OR</b>		
PSB 701	General Seminar	3
EDB 751	Ph.D seminar in Biology Education	3
PGC 701	Synopsis and grant writing	3
<b>Total</b>		<b>15</b>

**Second Semester**

Course code	Course Title	Credit Unit	Credit Unit
RME 702	Advanced Educational statistics II	3	3
PSB 773	Advanced Techniques in Plant Ecology	3	3
PSB 703	Special Seminar	3	3
EDB 752	Ph.D seminar II in Biology Education	3	3
<b>Total</b>		<b>12</b>	<b>12</b>

**Third-Fifth Semesters**

Independent Study, Proposal, Field Study, Data Analysis And Report Writing

**SIXTH SEMESTER**

Course code	Course Title	Credit Unit	Credit Unit
EDB 790	Ph.D Project in Biology Education	10	10

**COURSE DESCRIPTION**

**RME 601 Research Methods in Education (2 Units)**

Types of Research, methods and data; types of instruments; types of procedures for on methods of data analysis; application of computer in data analysis; presentation and conclusions.

**RME 603 Statistical Methods in Educational Research (3 Units)**

Review of Basic Statistical Concepts; descriptive, parametric, inferential and statistics; t-statistic, ANOVA, ANCOVA, Regression Analysis, Chi-square techniques for post-hoc analysis; application of computer in statistical analysis and results of statistical analysis.

**EDS 641 Science Curriculum Development, Evaluation and Innovation  
(3 Units)**

Different views on curriculum and their implications for science curriculum examination of the major curricular efforts in Nigeria, in the USA, in the UK and Eastern block country; practical experiences in the development of a chemistry curriculum. The role of curriculum in National Development, government participation development. Curriculum implementation in view of the national philosophies curriculum for contemporary development. Change, change models and the curriculum. Determinants of curriculum strategies for affecting curricular innovations. Formative and Summative evaluation in curriculum development. Techniques of curriculum evaluation, problems and prospects of curriculum evaluation in a contemporary world. Case studies of curriculum evaluation. Models of curriculum evaluation.

**EDS 605 Foundations of Science Education (2 units)**

Philosophy of science: meaning and nature of science, scientific knowledge, processes, attitudes and ethics. The nature and rationale for science education. Philosophical views of Thomas Kuhn, Karl Popper, James Brunner et cetera. Science Education as a discipline: history of science education and development of science education programmes in Nigeria.

**EDS 618 Issues and Trends in Science Education (2 units)**

Historical development of Science Education in Nigeria; Integration Policy in Science Education”

- Principles and evolution; Emerging Issues in Science Education.

- Global Policies; MDGs, SEDs, Climate change. Nigeria policy provision for Science Education at various levels of Education.

Gender, language and cultural/environmental issues; teaching/learning, psychosocial and enterpreneural issues in Science Education. Science, Technology and national development. Issues and Trends in students enrolment, achievement, interest, attitudes and teacher education programmes in Nigeria.

**EDS 624: Science Education and Disadvantaged Groups (2 Units)**

Conception of science for all and children with special needs: visual impaired, speech and hearing difficulties. Provision of science programmes/ softwares for the disadvantaged groups.

**EDS 631: Science, Technology and Societal Development (2 Units)**

Implications of the study of science on the development of society in the relevance social, political and economic advancement; contemporary scientific and development in selected countries including Nigeria.

**EDS 651: Graduate Seminar in Science Education (2 Units)**

Study, discussion and debate of selected topics/issues in Science education. Survey, analysis or research and development in the field. Preparation and presentation of individual projects and reports on different topics/issues relating to Science education.

**EDB 622: Materials and Resources for Teaching Biology (2 Units)**

Materials and resources necessary for biology teaching; role of biology laboratory and media in biology teaching. Management of teaching materials and personnel.

**EDB 690: Research Project in Biology Education (5 Units)**

Selection and completion of a project in Biology education under the guidance of a supervisor and presentation of the project report.

**PGC 601: Application of ICT in Research Methodology (3 Units)**

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study from African and Western perspectives. Major steps in research: Selection of Problem, literature review, design, data collection, analysis and interpretation, conclusions. Study of various research designs, historical, case studies, survey, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis, and result presentation. Essentials of spreadsheets, internet technology, internet search engines, statistical packages, precision and accuracy of estimates, principles of scientific research,

concepts of hypothesis formulation and testing, organization of research and report writing. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the school of postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**PGC 701: Synopsis and research grant writing (3 Units)**

Identification of types and nature of grant and grant writing; mining of grant application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant applications structures and contents and writing of concept notes, detailed project description, budgeting and budgeting defense. Project justification, review of critical problems, principles of scientific research, concepts of hypothesis formulation and testing, aims and objectives, essentials of literature review, methodology, experimental design, SWOT analysis, work plan, budgeting, expected outcome, beneficiary, cost benefit analysis, overall contributions to society. Study of sample grants writings in various forms and writing of mock research and other grants. Identification of University of Nigeria Synopsis structure and requirements (Introduction, methodology and results). Determining the content of each subunit of the synopsis. Steps in the writing of the synopsis from project report /dissertation/thesis. Structural and language issues. Common errors in synopsis writing and how to avoid them. The role of the student and the supervisor in the production of the synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution-based interactive workshop to be organized by the school of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**RME 701: Advance Research Methods in Education II (3 Units)**

The concept and nature; scientific processes in research; problem definition, variable identification; sources of research topics, theory construction and hypotheses formulation; techniques for literature review; principles of design, instrumentation, data collection, techniques for data analysis and presentation of results. Candidates must be introduced to computers and data analysis; analytical software and techniques in education. The orientation must be practical throughout as candidates are guided prepare tentative research proposals they must present and defend individually in class; techniques of research reporting; and research proposal writing.

**RME 702: Advanced Educational Statistics II (3 Units)**

Concepts of educational statistics; the role of statistics in education; descriptive statistics and the various areas of application in education; classroom data, school records, school demography, social relations in school; school administration and finances; Inferential statistics; population and sampling theory; non-parametric statistics, types and applications, types, applications and limitations. The nature of parametric statistics, types and applications in education, statistical models in education, application and limitations (correlation, univariate and multivariate analysis of educational data), the nature of significant tests, problems of inferences. Candidates must be taught to utilize computer in various phases of this course and to be familiar with various analytical software. Emphasis must be placed on

educational and practical application of basic statistical concepts in various educational disciplines.

**EDU 703: Information and Communication Technology II (3 Units)**

In-depth knowledge of skills and techniques of data processing in education. Overview of sources, storage, retrieval and dissemination of data/information. Programme design and management of data; Management of data bank. General problem solving with the use of information technology. Hands-on experience should be emphasized.

**EDU 790: Thesis (10 Units)**

Candidates are required to demonstrate research competencies by selecting a thesis topic in their relevant areas of specialization. The research is carried out by the individual student under the guidance of a competent supervisor according to graduate school requirements. The candidate is expected to make some significant contributions to knowledge. The Thesis is defended before an appropriately constituted examining committee chaired by the Head of the Department. The External Examiner's verdict shall override all other decisions.

**RME 751: Seminar in Biology Education I - 3 Credit Units**

Discussion and presentation of reports on selected proposal topic by each student in a chosen area of Biology Education as approved by the Department. The course shall be examined by means of a **Proposal Defense**.

**RME 752: Seminar in Biology Education II – 3 Credit Units**

Presentation of complete reports on selected Thesis topic by each student in a chosen area of Biology Education as approved by the Department. The course shall be examined by means of a detailed discussion of the completed thesis. Emphasis will be on appropriateness of issues raised in the background to the topic; Relevance of literature; Field activities; Data analysis and Results, among others.

## **CHEMISTRY EDUCATION PROGRAMMES**

### **Philosophy**

The philosophy of Postgraduate study programme in Chemistry Education is the development of professional chemistry teachers, educators and administrators who will be social agents of change through education in chemistry, researches and administration of chemical education.

### **Objectives**

The Objectives of M.Ed programme in Chemistry Education are:

- i) production of high calibre professional Chemistry teachers, educators and administrators;
- ii) development of knowledgeable and competent scholars who possess requisite research skills in Chemistry education.
- iii) production of high-level work force that can initiate

and or implement policies in the area of chemistry education for technological and industrial development.

- iv) produce Chemistry teachers, educators and administrators who can give Nigerian education a national identity while making relevant impact in the global context through exploration of cultural contents and context of chemistry education.

### **Job Opportunities**

Successful graduates of the above programme have ample teaching opportunities with various ministries of education, research institutes, Universities, Colleges of Educations, Polytechnics or private schools in Nigeria or elsewhere in the world. They also have job opportunities as educational administrators in the ministries of education , educational institutions and educational parastatals.

### **Basic Admission Requirements:**

The criteria for admission into the Master's programme (M.Ed) in chemistry Education will be as follows:

- (i) A good First Degree honours in Chemistry Education with a minimum of second class lower division from recognized university, with a CGPA of 3.5
- (ii) A good first degree honours in other disciplines with a minimum of 2nd class honours lower division, plus PGDE from a recognized University obtained at credit level.
- (iii) Candidates who hold HND in Chemistry from approved polytechnics must in addition have a PGDE at credit level and a CGPA of 3.5/0.
- (iv) In addition, a candidate will undergo a screening test or interview in the University and Department of Science Education
- (v) There will be evidence that they met the matriculation requirement of the University of Nigeria, Nsukka and evidence of having completed NYSC as indicated by discharge certificate or certificate of exemption / exclusion.

### **Duration of Programme:**

- i. A full time Master's degree programme should run for a minimum of 4 semesters and a maximum of 6 semesters
- ii. Part-time Master's programme should run for a minimum of 6 semesters and a maximum of 8 semesters,
- iii. For extension beyond the specified maximum period, a special permission of senate shall be required.

### **Requirements for Graduation:**

To be awarded a Master's degree in Chemistry Education, candidate must pass a minimum of 36 units of courses made up as follow:

- (i) Minimum core courses of 10 units
- (ii) Area of specialization minimum of 20 units
- (iii) MSc ( Ed) Research Project 6 units
- (iv) A student shall present at least one seminar, submit and defend a research dissertation
- (v) A student for a Master's degree in Chemistry Education programme shall carry out research in a relevant area of specialization and submit an acceptable research dissertation (6 units) which must be defended before a panel of external and internal examiners.

### **Stress Areas**

### **Codes**

➤ Foundation Courses

0

➤ Issues/Trends	1
➤ Evaluation	2
➤ Innovation	3
➤ Curriculum	4
➤ Seminar	5
➤ Methods/Materials	6
➤ Research	9

## MASTER'S DEGREE PROGRAMME IN CHEMISTRY EDUCATION

### FIRST YEAR

#### FIRST SEMESTER

Course Code	Course Title	Credit Unit
PGC 601	Application of ICT in research Methodology	3
EDS 641	Science Curriculum Development, Evaluation & Innovation.	3
EDS 605	Foundations of Science Education	2
EDU 613	Advanced Psychology of Learning	2
EDC 661	Methods and Material for Chemistry Instruction/Teaching	2
CHM 601	Inorganic Reaction Mechanism	2
CHM 617	Selected Topics in Physical Chemistry	2
CHM 621	Advanced Organic Reaction Mechanism	2
RME 601	Research Method in Education	2
RME 603	Statistical Method in Educational Research	3
<b>Total</b>		<b>23</b>

#### SECOND SEMESTER

Course Code	Course Title	Credit Unit
RME 604	Advanced Statistical Methods in Education	2
EDS 636	Science, Technology, Society and Development	2
EDS 618	Issues and Trends in Science Education	2
EDS 624	Science Education and Disadvantaged Groups	2
<b>Total</b>		<b>8</b>

### SECOND YEAR

#### Third & Fourth Semester

<b>Course code</b>	<b>Course Title</b>	<b>Credit Unit</b>
EDC 651	Graduate Seminar in Chemistry Education	3
EDC 690	Research Project in Chemistry Education.	6
<b>Total</b>		<b>9</b>
<b>Total of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> Semesters</b>		<b>40</b>

### **Ph.D PROGRAMME IN CHEMISTRY EDUCATION**

#### **Duration of Doctoral programme (after Master's degree)**

Full-time	A minimum of 6 semesters Maximum of 10 semesters
Part-time	A minimum of 8 semesters Maximum of 12 semesters

#### **First Semester**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Unit</b>
RME 701	Advanced Research methods II	3
EDU 703	Information and communication technology (ICT) II	3
CHM 701	Current Trends in inorganic chemistry	4
CHM 711	Current trends in physical chemistry	4
PGC 701	Synopsis and grant writing	3
EDC 752	Ph.D Seminar in Chemistry Education	3
<b>Total</b>		<b>20</b>

#### **Second Semester**

<b>Course code</b>	<b>Course Title</b>	<b>Credit Unit</b>
EDU 702	Advanced Educational statistics II	3
CHM 721	Current trends in organic chemistry	4
CHM 731	Current Tends in Analytical chemistry	4



EDC 722 Ph.D seminar in Chemistry Education 3

**Total 14**

### **Third Semester – Fifth Semester**

Independent Study, Proposal, Field Study, Data analysis and Report Writing.

### **Sixth Semester**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
EDC 790	Ph.D Thesis	10
<b>TOTAL</b>		<b>10</b>

## **COURSE DESCRIPTIONS FOR PG PROGRAMMES**

### **RME 601: Research Methods in Education (2 Units)**

Types of Research, methods and data; types of instruments; types of procedures for on methods of data analysis; application of computer in data analysis; presentation and conclusions.

### **RME 604: Advanced Statistical Methods in Education (2 Units)**

Review of Basic Statistical Concepts; descriptive, parametric, inferential and statistics; t-statistic, ANOVA, ANCOVA, Regression Analysis, Chi-square techniques for post-hoc analysis; application of computer in statistical analysis and results of statistical analysis.

### **EDS 641: Curriculum Development, Evaluation and Innovation in Science Education (3 Units)**

Different views on curriculum and their implications for science curriculum examination of the major curricular efforts in Nigeria, in the USA, in the UK and Eastern block country; practical experiences in the development of a chemistry curriculum. The role of curriculum in National Development, government participation development. Curriculum implementation in view of the national philosophies curriculum for contemporary development. Change, change models and the curriculum. Determinants of curriculum strategies for affecting curricular innovations. Formative and Summative evaluation in curriculum development. Techniques of curriculum evaluation, problems and prospects of curriculum evaluation in a contemporary world. Case studies of curriculum evaluation. Models of curriculum evaluation.

### **EDS 605: Foundations of Science Education (2 units)**

Philosophy of science: meaning and nature of science, scientific knowledge, processes, attitudes and ethics. The nature and rationale for science education. Philosophical views of Thomas Kuhn, Karl Popper, Jerome Brunner et cetera. Science Education as a discipline, Historical Foundations of science education, Science Education and development, Development of science education in Nigeria. Psychological Foundations of Science Education, Sociological Foundations of Science Education.

**RME 603: Statistical Methods in Education Research (3 Unit)**

Review of some basic statistical concepts: descriptive, parametric, inferential and t-statistics, ANCOVA, Regression Analysis, chi-square techniques for post-hol analysis. Application of concept in statistical analysis and results or statistical analysis.

**EDS 618: Issues and Trends in Science Education (2 units)**

Gender, language, cultural/environmental, teaching/learning, psychosocial and entrepreneurial issues in science education. Science and national development. Trends in students' enrollment/achievement and teacher- education.

**EDS 624: Science Education and Disadvantaged Groups  
(2 Units)**

Conception of science for all and children with special needs: visual impaired, speech and hearing difficulties. Provision of science education for all, Rational for Science Education all, Concept of disadvantages in Science education, Identification of the disadvantaged in science education, Science Education for the disadvantaged groups, effective strategies, challenges, and management of science education for the disadvantaged.

**EDS 636: Science, Technology and Society and Development  
(2 Units)**

Implications of the study of science on the development of society in the relevant social, political and economic advancement; contemporary scientific and development in selected countries including Nigeria.

**EDS 651: Graduate Seminar in Chemistry Education (2 Units)**

Study, discussion and debate of selected topics/issues in chemical education. Survey, analysis or research and development in the field. Preparation and presentation of individual projects and reports on different topics/issues relating to chemical education.

**EDC 661: Methods and Materials for Chemistry Instruction  
(2 Units)**

Materials and resources necessary for chemistry teaching; role of chemistry laboratory and media in chemistry teaching. Management of chemistry teaching materials and personnel.

### **EDC 690: Research Project in Chemistry Education (6 Units)**

Selection and completion of a project in chemistry education under the guidance of a supervisor and presentation of the project report.

### **PGC 601: Application of ICT in Research Methodology (3 Units)**

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study from African and Western perspectives. Major steps in research: Selection of Problem, literature review, design, data collection, analysis and interpretation, conclusions. Study of various research designs, historical, case studies, survey, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis, and result presentation. Essentials of spreadsheets, internet technology, internet search engines, statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypothesis formulation and testing, organization of research and report writing. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the school of postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

### **PGC 701: Synopsis and grant writing (3 Units)**

Identification of types and nature of grant and grant writing; mining of grant application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant applications structures and contents and writing of concept notes, detailed project description, budgeting and budgeting defense. Project justification, review of critical problems, principles of scientific research, concepts of hypothesis formulation and testing, aims and objectives, essentials of literature review, methodology, experimental design, SWOT analysis, work plan, budgeting, expected outcome, beneficiary, cost benefit analysis, overall contributions to society. Study of sample grants writings in various forms and writing of mock research and other grants. Identification of University of Nigeria Synopsis structure and requirements (Introduction, methodology and results). Determining the content of each subunit of the synopsis. Steps in the writing of the synopsis from project report/dissertation/thesis. Structural and language issues. Common errors in synopsis writing and how to avoid them. The role of the student and the supervisor in the production of the synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution-based interactive workshop to be organized by the school of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

### **RME 701: Advance Research Methods in Education II (3 Units)**

The concept and nature; scientific processes in research; problem definition, variable identification; sources of research topics, theory construction and hypotheses formulation; techniques for literature review; principles of design, instrumentation, data collection, techniques for data analysis and presentation of results. Candidates must be introduced to computers and data analysis; analytical software and techniques in education. The orientation must be practical throughout as candidates are guided prepare tentative research proposals they must present and defend individually in class; techniques of research reporting; and research proposal writing.

### **RME 702: Advanced Educational Statistics II (3 Units)**

Concepts of educational statistics; the role of statistics in education; descriptive statistics and the various areas of application in education; classroom data, school records, school demography, social relations in school; school administration and finances; Inferential statistics; population and sampling theory; non-parametric statistics, types and applications, types, applications and limitations. The nature of parametric statistics, types and applications in education, statistical models in education, application and limitations (correlation, univariate and multivariate analysis of educational data), the nature of significant tests, problems of inferences. Candidates must be taught to utilize computer in various phases of this course and to be familiar with various analytical software. Emphasis must be placed on educational and practical application of basic statistical concepts in various educational disciplines.

### **EDU 703: Information and Communication Technology II(3 Units)**

In-depth knowledge of skills and techniques of data processing in education. Overview of sources, storage, retrieval and dissemination of data/information. Programme design and management of data; Management of data bank. General problem solving with the use of information technology. Hands-on experience should be emphasized.

### **EDC 751: Ph.D seminar in Chemistry Education I ( 3 Units )**

Discussion and presentation of reports on selected proposal topic by each student in a chosen area of Chemistry Education as approved by the Department. The course shall be examined by means of a **Proposal Defense**.

### **EDC 752: Ph.D seminar in Chemistry Education II ( 3 Units )**

Presentation of complete reports on selected Thesis topic by each student in a chosen area of Chemistry Education as approved by the Department. The course shall be examined by means of a detailed discussion of the completed thesis. Emphasis will be on appropriateness of issues raised in the background to the topic; Relevance of literature; Field activities; Data analysis and Results, among others.

## **EDU 790: Ph.D Thesis (10 Units)**

Candidates are required to demonstrate research competencies by selecting a thesis topic in their relevant areas of specialization. The research is carried out by the individual student under the guidance of a competent supervisor according to graduate school requirements. The candidate is expected to make some significant contributions to knowledge. The Thesis is defended before an appropriately constituted examining committee chaired by the Head of the Department. The External Examiner's verdict shall override all other decisions.

### **PHYSICS EDUCATION PROGRAMME**

#### **PHILOSOPHY**

Considering the role of Science, Technology and Mathematics in the social and economic advancement of our nation, the necessity to train high level manpower in Science Education cannot be over emphasized. The overall philosophy of postgraduate programmes in Physics Education is the development of professional educators who are social engineers of change through education either as professional teachers, researchers or managers of educational institutions and end-user organizations. The M.Sc/Ph.D programmes in Physics Education are specifically designed to enhance the quality of Physics Teachers as well as Physics Educators towards the actualization of this philosophy.

#### **OBJECTIVES OF THE PROGRAMME:**

Generally, the programmes are designed to prepare holders of Ph.D Masters Degrees in Physics Education who would provide leadership, effective research and teaching at different levels of higher education.

Specifically, the M. Sc/Ph.D (Physics Education) programmes would consolidate on the earlier stated aims of the Physics Education programme in all aspects of learning as follows:

- i. further development of professional expertise of students in Physics Education;
- ii. further development of knowledgeable scholars who would provide leadership in professional practice and intellectual competence in Physics Education at tertiary level;
- iii. further production of Physics educators who are knowledgeable in and committed to the implementation of our national policy on Education at the tertiary;
- iv. further development of competent researchers in Education theory and practice in Physics for Nigeria's Education system;
- v. further production of Physics Educators who can propel social change through Education both intellectually in attitudes, skills, values, and world views;
- vi. producing Physics Educators who are committed to reform Educational delivery through effective application and utilization of ICT in both national and global contexts; and
- vii. providing relevant intellectual capital in Physics

Education for Nigeria and the rest of the world.

### **JOB OPPORTUNITIES:**

Successful graduates of the above programmes have ample teaching opportunities with various ministries of education, research institutes, Universities, Colleges of Educations, Polytechnics or private schools in Nigeria or elsewhere.

### **M.Ed PHYSICS EDUCATION PROGRAMME**

#### **ADMISSION REQUIREMENTS:**

The criteria for admission into the Master's programme (M.Ed ) Chemistry Education shall be as follows:

- i. Candidates who hold Bachelor's degrees in Physics education from an approved university must obtain a minimum of second Class (Honours) lower division with a CGPA of 3.5/0 for an academic programme.
- ii. Candidates who hold HND in Physics from approved polytechnics must in addition have a PGDE at credit level and a CGPA of 3.5/0.
- iii. In addition, a candidate will undergo a screening test or interview in the University and Department of Science Education.

#### **EXPECTED DURATION OF PROGRAMME:**

- i. A full time Academic Masters programme should run for a minimum of 4 semesters and a maximum of 6 semesters
- ii. Part-time Academic Master's programme should run for a minimum of 6 semesters and a maximum of 8 semesters,
- iii. For extension beyond the specified maximum period, a special permission of senate shall be required.

#### **REQUIREMENTS FOR GRADUATION:**

To be awarded a Master's degree in Physics Education candidate must pass a minimum of 36 units courses made up as follow:

- i. Minimum core courses of 10 units
- ii. Area of specialization minimum of 20 units
- iii. M.Sc.( Ed) Project 6 units
- iv. A student shall present at least one seminar, submit and defend a research dissertation
- v. A student for an Academic Master's degree in Physics education programme shall carry out research in a relevant area of specialization and submit an acceptable research dissertation (6 units) which must be defended before a panel of external and internal examiners.

#### **STRESS AREAS**

#### **Codes**

➤	Foundation Courses	0
➤	Issues/Trends	1
➤	Evaluation	2
➤	Innovation	3

➤	Curriculum	4
➤	Seminar	5
➤	Methods/Materials	6
➤	Research	9

## MASTER DEGREE PROGRAMME FOR PHYSICS EDUCATION

### FIRST SEMESTER

Course Code	Title	Credit Unit
PGC 601	Applications of ICT in Research Methodology	3
RME 601	Research Methods in Education	2
EDU 613	Psychology of Learning	2
RME 603	Statistical Methods in Educational Research	3
EDS 641	Science Curriculum Development and Innovation	3
EDS 605	Foundations of Science Education	2
EDP 661	Methods and Materials in Physics Education	2
PHY 603	Quantum Mechanics	2
PHY 605	Statistical Physics	2
PHY 607	Methods of theoretical physics	2
<b>Total</b>		<b>23</b>

### SECOND SEMESTER

Code	Title	Credit Units
EDS 618	Issues and Trends in Science Education	2
EDS 636	Science, Technology, Society and Development.	2
EDS 624	Science Education & Disadvantaged Groups	2
PHY 602	Classical Electrodynamics	2
PHY 604	Computational Analysis in Physics.	2
RME 604	Advanced Statistical Methods in Education	2
<b>Total</b>		<b>14</b>

### SECOND YEAR

### THIRD & FORTH SEMESTERS

Course Code	Title	Credit Units
EDS 651	Graduate Seminar in Science Education	3
EDP 690	Master's degree Research Project	6
<b>Total</b>		<b>9</b>

## Ph.D PHYSICS EDUCATION

### BASIC ADMISSION REQUIREMENTS:

Candidates seeking for Ph.D admission in Physics education must satisfy the following conditions:

- i. All Candidates must have a master's degree in the Physics

- Education with a CGPA of 4.0 or 60% and above.
- ii. Holders of M. Phil in Physics Education
- iii. In addition, a candidate may undergo a screening exercise by the University involving examination or interview.

**DURATION OF PROGRAMME:**

- i. A full time Physics Education Doctorate programme shall run for a minimum of 6 semesters and a maximum of 10 semesters,
- ii. Part-time Physics Education Doctoral programme shall run for a minimum of 8 semesters and a maximum of 12 semesters.
- iii. For extension beyond the specified maximum period, a special permission of Senate shall be required.

**REQUIREMENTS FOR GRADUATION:**

To be awarded a Doctor of Philosophy in Physics Education candidate must pass a minimum of 40 units of courses made up as follow:

- i. Minimum 3 core courses of 3 credits units each giving total of 9 units
- ii. A minimum of 4 courses of 3 credit units each in the area of specialization 12 units
- iii. Ph.D Thesis of 10 credit units
- iv. All registered courses shall be passed by the candidate

**STRESS AREAS**

**Codes**

➤	Foundation Courses	0
➤	Issues/Trends	1
➤	Evaluation	2
➤	Innovation	3
➤	Curriculum	4
➤	Seminar	5
➤	Methods/Materials	6
➤	Research	9

**Ph.D. PROGRAMME FOR PHYSICS EDUCATION**

**FIRST SEMESTER**

Code	Title	Credit Unit
PGC 701	Synopsis and Grant Writing	3
EDS 721	Advanced Science Curriculum Design, Development, Evaluation and Practice	3
PHY703	Computer Methods in Physics	3
PHY705	Recent Advances in Physics	3
PHY 755	Experimental Study of Solar Energy	3
RME 701	Advanced Research Method II	3



EDU 703	Information and Communication Technology II	3
	<b>Total</b>	<b>21</b>

## SECOND SEMESTER

Code	Title	Unit
RME 702	Advanced Educational Statistics	3
EDP 732	Process Skills in Physics Education	3
EDU 741	Advanced ICT & Educational Data Processing	3
PHY 741	Operational Geophysics	3
	<b>Total</b>	<b>12</b>

## Semester Three

Code	Title	Unit
EDP 751	Seminar in Physics Education I	3
	<b>Total</b>	<b>3</b>

## Semester Four

Code	Title	Unit
EDU 741	Workshop and Laboratory Practice in	3
EDP 752	Seminar in Physics Education II	3
	<b>Total</b>	<b>6</b>

## Semesters Five and Six

S/N	Code	Title	Unit
1	EDP 790	Ph.D Thesis	10
		<b>Total</b>	<b>10</b>

[Grand Total of Credit Units is 52]

## COURSE DESCRIPTIONS FOR MASTER'S DEGREE

### PGC 601: Application of ICT in Research Methodology (3 Units)

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study from African and Western perspectives. Major steps in research: Selection of Problem, literature review, design, data collection, analysis and interpretation, conclusions. Study of various research designs, historical, case studies, survey, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis, and result presentation. Essentials of spreadsheets, internet technology, internet search engines, statistical packages, precision and accuracy of

estimates, principles of scientific research, concepts of hypothesis formulation and testing, organization of research and report writing. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the school of postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**EDS. 641: Curriculum, Evaluation, and Innovation in Science Education (2 units)**

Analysis of various curriculum theories, nature of curriculum field, philosophical analysis of models of curriculum planning and development, pedagogical approaches to various educational activities. Theoretical dimensions in curriculum practice, emerging global issues in curriculum such as gender studies, peace and conflict resolution etc and curriculum implementation.

Different ways of designing science curriculum- Their merits as well as demerits. Curriculum theories and implementation principles for curriculum assessment and review. An in-depth application of the theories and principles to Physics curriculum in schools.

**EDP 623: Process Skills in Physics Education (2 units)**

Basic and integrated skills. Ways of assessing process skills and their respective advantages. Process (on-the-spot) assessment. Products assessment schedules. Paper and pencil tests. e-test: preparation, administration and scoring. Workshop and Laboratory Practice; their meanings and relevance. Strategies in preparation of and mounting a workshop. Assessment of participants' outcome in workshops. Preparation for and conducting laboratory practice, Components of subject and interdisciplinary laboratories, Safety in workshop and laboratory practice to include laboratory rules and hazards prevention/control. The Learners' record book - receding assessment and evaluation. Visits to standard laboratories.

**EDS. 651: Seminar in Science Education (3 units)**

This will be in two sections:

- a) A general review of organization of studies in Physics Education by all students.
- b) Students are expected to choose any topic in the Physics Education and present a seminar paper based on it.

**EDP 690: Master's Degree Project (6 units)**

Each Student will carry out a research under a supervisor. The work will have relevance to Physics Education in Nigeria and will make contribution to knowledge in this area.

**PHY 602: Classical Electrodynamics (2 units)**

Maxwell's equation-covariance under Lorentz transformation, four potential, field tensor, Lorentz gauge. Motion of charged particles in electromagnetic field. Fields due to a system of charges - retarded potential, Multiple expansion of electromagnetic field. Radiation from accelerated charges- problem of radiation reaction and self energy.

**PHY 603: Quantum Mechanics (2 units)**

Fundamental principles of quantum mechanics. Schrodinger, Heisenberg and interaction pictures. Operators, state vectors representations, Dirac notations. Elements of scattering theory. Born approximation; time-dependent perturbation theory. Green's function method, partial wave expansion. Application to the H-atom and laser. Theory of angular momentum-addition of angular momentum.

**PHY 604: Computational Analysis in Physics (2 units)**

Introduction to UNIX ( dif, awk, genit, vi) MATLAB array operations 2-D and 3-D plots with Matlab calculus and transforms with matlab FORTRAN programming. Python scripting and applications in physical problems, C & C++ programming index.

**PHY 605: Statistical Physics (2 units)**

Liouville theorem. Micro canonical ensemble. Canonical and grand canonical ensembles. Fluctuations. Darwin-Fowler method, classical limits of statistical mechanics Equipartition theorem. Black body radiation. Debye theory of specific heat. Foundation of statistical mechanics. Ideal classical, Bose and Fermi gases. Imperfect gas. Cluster expansion. Phase transition. The Isino Model. Molecular field approximation. Critical fluctuation. Time correlation function. Fluctuation-dissipation theorem.

**PHY 607: Methods of Theoretical Physics (2 units)**

Use of Fourier series. Fourioier and Laplace transforms in physics. Uses of complex variable and analytical continuation. Solutions of second order ordinary and partial differential equations. Mathieu, Legendreequations etc. Greens functions. Integral equations and Feynman's diagrammatic techniques. Theory of matrices. Numerical methods. Eigen values problems. Transformations and elements of group theory and applications.

**RME 601: Research Methods in Education - 2 Credits**

Types of research, method and data, types of instruments; types of procedures for data collection; methods of data analysis, application of computer in data analysis, presentation of results and conclusions.

**RME 603: Statistical Methods in Educational Research - 3 Credits**

Review of Basic statistical concepts, descriptive, parametric, inferential and non-parametric statistics; t-statistic, ANOVA, ANCOVA, Regression analysis, chi-square and statistical techniques for post-hoc analysis; application of computer in statistical analysis; meaning and results of statistical analysis.

**EDS 605: Foundations of Science Education**

Philosophy of science: meaning and nature of science, scientific knowledge, processes, attitudes and ethics. The nature and rationale for science education. Philosophical views of Thomas Kuhn, Karl Popper, James Brunner et cetera. Science Education as a discipline: history of science education and development of science education programmes in Nigeria.

**EDP 661: Methods & Materials in Physics Education**

Materials and resources necessary for physics teaching; role of physics laboratory and media in physics teaching. Management of teaching materials and personnel.

#### **EDS 624: Science Education & Disadvantaged Groups**

Conception of science for all and children with special needs: visual impaired, speech and hearing difficulties. Provision of science education for all, Rational for Science Education all, Concept of disadvantages in Science education, Identification of the disadvantaged in science education, Science Education for the disadvantaged groups, effective strategies, challenges, and management of science education for the disadvantaged.

#### **EDS 618: ISSUES AND TRENDS IN SCIENCE EDUCATION**

Historical development of Science Education in Nigeria; Integration in Science Education - Principles and evolution; Emerging Issues in Science Education.  
- Global Policies; MDGs, SEDs, Climate change. Nigeria policy provision for Science Education at various levels of Education.  
Gender, Language and cultural/environmental issues; teaching/learning, psychosocial and entrepreneurial issues in Science Education. Science, Technology and national development. Issues and Trends in students enrolment, achievement, interest, attitudes and teacher education programmes in Nigeria.

#### **RME 604 : Advanced Statistical Methods in Education - 2 Credits**

Further work in statistics and their application to education. Multiple and multivariate regression, ANOVA, ANCOVA, MANOVA. Factor analysis, discriminant analysis, canonical correlation. Non-parametric statistics, including contingency tables. Interpretation of output of computer programmes in the statistics.

#### **EDS 636: SCIENCE, TECHNOLOGY AND SOCIETY (2 Unity)**

Implications of the study /practice of science or the environment/society and their development in the relevant social economic, political and cultural issues.

#### **COURSE DESCRIPTION FOR Ph.D**

#### **PGC 701: Synopsis and Grant Writing in Physics (3 Units)**

Identification of types and nature of grant writing; meaning of grant application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant applications, budgeting and budget defense in grants applications. Study of sample grant writings in various forms. Writing of mock research proposal for grants. Identification of University of Nigeria synopsis structure and requirements. Determining the content of each sub-unit of the synopsis. Steps in writing of synopsis from Thesis document. Structural and language issues in Thesis writing. Common errors in synopsis writing and strategies for avoiding them. The role of the student and the supervisor in the production of synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution-based interactive workshop to be organized by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts

#### **PHY 703: Computational Analysis in Physics (3 Units)**

Introduction to UNIX (diff. awk, gedit, vi) MATLAB array operations 2-D and 3-D Plots with Matlab calculus & transforms with matlab FORTRAN programming. Python scripting and applications in physical problems, C & C++ programming latex.

**PHY 705: Recent Advances in Physics (3 Units)**

Review of minimum of 20 journal papers on a topic other than the topic of research of the student in his/her area of specialization. [Astronomy and Astrophysics, Atmospheric Sciences, Solar Physics, Solid State Physics, Geophysics, Theoretical Physics]

**PHY 741: Operational Geophysics (3 Units)**

Use of geophysical instruments, field work. Aeromagnetic maps and processing. General details of geophysical methods, processing and interpretations of data. Seminar.

**PHY 751: Observational Astronomy (3 Units)**

Spherical Astronomy, Optical/astronomy, bands and features. Observational techniques in optical/IR astronomy. Optical/telescopes and their features (interferometers), Radio astronomy bands and observables, Radio interferometry x- & R- ray astronomy. Data handling in astronomy.

**PHY 761: Tools in Atmospheric Physics (3 Units)**

Weather instruments, Cosmic rays instruments, geomagnetic field instruments, remote sensing instruments, field measurements of atmospheric and geophysical parameters, processing and interpretation of atmospheric data, satellite applications, Seminar.

**PHY 775 Experimental Study of Solar Energy (3 Units)**

Experimental study of the operations and performance of the Following:

- (a) Selected solar Photovoltaic Utilities
- (b) Selected solar Photo-thermal Utilities
- (c) Selected solar Energy Storage Units
- (d) Group seminar

**EDP 721: Advanced Science Curriculum Design, Development, Evaluation and Practice in Physics: (3 Units)**

**Section A:** Detailed analysis of various curriculum theories, nature of curriculum field. Philosophical, Psychological, Sociological dimensions of curriculum planning and development. Pedagogical approaches to various educational activities in the Physics curriculum. Theoretical dimensions in curriculum practice, emerging global issues in curriculum such as gender studies, peace and conflict resolution etc and curriculum implementation.

**Section B:** Different ways of designing science curriculum- Their merits as well as demerits. Curriculum theories and implementation principles for curriculum assessment and review. An in- depth application of the theories and principles to Physics curriculum in schools.

**RME 702: Advanced Educational Statistics (3 Units)**

Statistical inference, probability theory, test of hypotheses and significance. Analysis of variance and correlation analysis and their application to Educational research. Multiple regression and analysis of covariate and Multivariate statistical procedures encountered in social research. The use of computers and minicomputers to explain statistical concepts and compute statistical indices.

**EDP 732: Process Skills in Physics Education (3 Units)**

Basic and integrated skills. Ways of assessing process skills and their respective advantages. Process (on-the-spot) assessment. Products assessment schedules. Paper and pencil tests. e-test: preparation, administration and scoring.

**EDU 741: Advanced ICT & Educational Data Processing (3 Units)**

Conversion of test scores, questionnaire responses, among others and transforming them into measures of central tendency, variability and computing statistical test of significance. The course is concerned with the principles and methods used in processing and interpreting data based on 'statistical packages for social science (SPSS). Overview of sources, storage, retrieval and dissemination of data/information. Programme design, management of data. Management of data bank. General problem solving with the use of information technology. Hands-on experience should be emphasized.

**EDP 751: Seminar in Physics Education I (3 Units)**

Discussion and presentation of reports on selected proposal topics by each student in a chosen area of Physics education as approved by the department. The course shall be examined by means of a proposal defense.

**EDP 752: Seminar in Physics Education II (3 Units)**

Presentation of completed report on selected thesis topic by each student in chosen area of physics education as approved by the department. The course shall be examined by means of a detailed discussion of the completed thesis. Emphases will be on appropriateness of issues raised in background to the topic; relevant of literature; field activities; data analysis; and results among others.

**EDP 790: Ph.D Thesis (10 Units)**

Each Student will carry out a research under a supervisor. The work will have relevance to Physics Education in Nigeria and will make contribution to knowledge in this area. He will present Thesis on the project to both internal and external academic panel.

**MATHEMATICS EDUCATION PROGRAMME**

**Philosophy**

The philosophy of the postgraduate Mathematics Education programme is the development of professional Mathematics educators, who are social engineers of change through Mathematics Education, either as professional mathematics teachers, researchers or managers of educational institutions and end-user organizations.

**Aims and Objectives**

The aims and objectives of the Postgraduate Mathematics Education Programme are to:

- i. develop professional expertise of students in mathematics education.
- ii. develop knowledgeable scholars who will provide leadership in professional practice and intellectual competence in mathematics education.
- iii. produce mathematics educators who are knowledgeable in and committed to the implementation of the National Policy on Education.

- iv. develop competent researchers in mathematics education theory and practice for Nigeria education system.
- v. empower mathematics educators who can propel social change through mathematics education both intellectually, in attitudes, skills, values and world views.
- vi. produce mathematics educators who can give Nigerian education a national identity while making it relevant in a global context.

### **Job Opportunities**

Successful graduates of the above programme have ample teaching opportunities with various ministries of education, research institutes, Universities, Colleges of Educations, Polytechnics or private schools in Nigeria or elsewhere in the world.

### **Admission requirement for Master's Degree**

Candidates who hold Bachelor's degrees from approved University must obtain a minimum of second class lower division with a CGPA of 3.5.0 Candidates with B. Sc Mathematics and PGDE are eligible for admission into M. Ed programme.

### **Duration of programme**

- i. A full time Mathematics Education Masters programme shall run for a minimum of 4 semesters and a maximum of 6 semesters,
- ii. Part-time Mathematics Education Masters programme shall run for a minimum of 6 semesters and a maximum of 8 semesters.
- iii. For extension beyond the specified maximum period, a special permission of Senate shall be required.

<b>Stress Areas</b>	<b>Codes</b>
➤ Foundation Courses	0
➤ Issues/Trends	1
➤ Evaluation	2
➤ Innovation	3
➤ Curriculum	4
➤ Seminar	5
➤ Methods/Materials	6
➤ Research Project	9

## **MASTER'S DEGREE PROGRAMME IN MATHEMATICS EDUCATION**

<b>Course Code</b>	<b>First Semester Title</b>	<b>Credit Unit</b>
EDM 641	Curriculum Planning and Development in Mathematics Education	<b>2</b>
EDM 605	Foundations of Mathematics Education	<b>2</b>
EDM 661	Methods and Materials for Mathematics Education	<b>2</b>
RME 603	Statistical Method in Educational Research	<b>3</b>
MTH <b>541</b>	Real Analysis	<b>3</b>

PGC 601	Application of ICT in Research Methodology	3
<b>Total</b>		<b>17</b>

### Second Semester

Course Code	Title	Credit Unit
EDM 621	Evaluation of Mathematics Curriculum and Instruction I	2
EDM 632	Innovation in School Mathematics I	2
RME 604	Advanced Statistical Methods in Education	2
MTH 512	Complex Analysis	3
<b>Total</b>		<b>11</b>

### Second Year 3<sup>rd</sup> and 4<sup>th</sup> Semesters

Course Code	Title	Credit Unit
EDM 651	Graduate Seminar in Mathematics Education	3
EDM 690	Master Degree Research Project	6
<b>Total</b>		<b>9</b>

### PHD PROGRAMME IN MATHEMATICS EDUCATION

#### Duration of Doctoral programme (after Master's degree)

Full-time	A minimum of 6 semesters Maximum of 10 semesters
Part-time	A minimum of 8 semesters Maximum of 12 semesters

### First Semester

Course Code	Title	Credit Unit
RME 701	Advanced Research Methods II	3
EDU 703	Information and Communication Technology (ICT) II	3
EDM 721	Evaluation of Mathematics Curriculum and Instruction II	3
MTH 805	Partial Differential Equations I	3
MTH 803	Real Analysis	3
EDM 751	Seminar I (Directed Individual Study)	3
PGC 701	Synopsis and research grant writing	3
<b>Total</b>		<b>18</b>



Course	Second Semester	
	Title	Credit Unit
RME 702	Advanced Educational Statistics II	3
EDM 712	Issues and Trends in Mathematics Education	3
EDM 732	Innovation in School Mathematics II	3
MTH 807	Advance Methods of Applied Maths.	3
MTH 804	Complex Analysis	3
EDM 752	Seminar II (Directed Individual Study)	3
EDM 790	Ph.D Thesis	10
<b>Total</b>		<b>25</b>

### Third to Fifth Semester

Independent Study, Proposal, Field Study, Data Analysis and Report writing

Sixth Semester

**EDM 790:** Final presentation of Ph.D Thesis 10 unit

### COURSE DESCRIPTION FOR MASTERS DEGREES

#### **EDM 641: - Curriculum Planning and Development in Mathematics Education ( 2 Units)**

Historical development of mathematics education curriculum; Curriculum theory and practice; views on curriculum and their implications for mathematics curriculum development; Practical experiences in the development of mathematics curriculum for selected levels of education.

#### **RME 601: - Research Methods in Education I (2 Units)**

The scope of research in education; sources of research data and techniques of data collection; sampling. Analysis of data in the use of statistical techniques, mechanical, electrical and electronic aids to data processing. Thesis and dissertation writing.

#### **EDM 605: - Foundations of Mathematics Education (2Units)**

Historical foundations of Mathematics, Psychological theories of learning mathematics as bases for its curricula development and teaching. Impact of technology and society on mathematics curriculum.

#### **EDM 661: - Methods and Materials for Mathematics Education ( 2 Units )**

Major pedagogical issues and principles in the teaching and learning of mathematics at the UBE, post-UBE and tertiary levels of the Nigerian Educational system. Identification, procurement and utilization of relevant materials for the teaching of mathematics at the specified levels.

**EDM 621: - Evaluation of Mathematics Curriculum and Instruction ( 2 Units)**

Major processes involved in the evaluation of mathematics instruction, as they relate to the cognitive, affective and psychomotor domains and their applications to continuous assessment. Analysis of the processes of evaluating the mathematics curriculum and text books will also be covered and such processes will be applied in evaluating all mathematics curricula from UBE through post-UBE to tertiary levels of education.

**EDM 632: - Innovations in School Mathematics I**

Review of UBE and post-UBE schools mathematics curriculum contents with emphasis on the innovative topics included in the curriculum in the areas of Mechanics, Statistics and Analysis. Innovations in methods, materials, teaching strategies and evaluation related to these contents.

**RME 603: Statistical Methods in Educational Research - (3 Credits )**

Review of Basic statistical concepts, descriptive, parametric, inferential and non-parametric statistics; t-statistic, ANOVA, ANCOVA, Regression analysis, chi-square and statistical techniques for post-hoc analysis; application of computer in statistical analysis; meaning and results of statistical analysis.

**EDM 651: Seminar in Mathematics Education (2 Credit)**

Readings, assignments, discussion and presentation of reports on selected topics by each student in one chosen area of specialization as approved by the Department. The course will be examined by means of assessment of students project at completion stage by a set panel.

**PGC 601: Application of ICT in Research methodology (3 Units)**

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study from African and Western perspectives. Major steps in research: Selection of Problem, literature review, design, data collection, analysis and interpretation, conclusions. Study of various research designs, historical, case studies, survey, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis, and result presentation. Essentials of spreadsheets, internet technology, internet search engines,

statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypothesis formulation and testing, organization of research and report writing. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the school of postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**MTH 512: – Complex Analysis** **3 Units**

Analytical functions and conformal mappings. Analytical continuations and elementary Riemann surfaces. Transformations, infinite products; entire functions; include order and types, the product theorems of Weierstrass and others; the Riemann mapping theorems.

**MTH 541:- Real Analysis** **3 Units**

Review of the concept of upper and lower limits of bounded sequences. Category spaces, the Baire category lemma, the unit open ball lemma, Zorn's lemma. Basic properties of Hilbert space and Banach spaces. Theory of functions of a real variable. Lebesgue measure and integral. Differentiation and integration.

**Course Description for Ph.D**

**RME 701: - Advanced Research Methods in Education II**  
**(3 Units)**

The concept and nature of research; scientific processes in research; problem definition, variable identification; sources of research topics; theory construction and hypotheses formulation; techniques for literature review; principles of design, instrumentation, data collection, techniques for data analysis and presentation of results. Candidates must be introduced to computers and data analysis; analytical software and techniques in education. The orientation must be practical throughout as candidates are guided to prepare tentative research proposals they must present and defend individually in class; techniques of research reporting; and research proposal writing.

**EDU 703: - Information and Communication Technology**  
**(ICT) II** **(3 Units)**

In-depth knowledge of skills and techniques of data processing in education. Overview of sources, storage, retrieval and dissemination of data/information; Programme design and management of data; Management of data bank. General problem solving with the use of information technology, Hands-on experience should be emphasized.

**RME702: Advanced Educational Statistics II** **3 Units**

Concept of educational statistics; the role of statistics in education; descriptive statistics and the various areas of application in education; classroom data, school records, school demography, social relations in school; school administration and finances; Inferential statistics; population and sampling theory, non-parametric statistics in education; hypothesis assumptions; types, applications and limitations. The nature of parametric statistics, types and

applications in education; statistical models in education, application and limitations (correlation, univariate and multivariate analysis of educational data), the nature of significant tests, problems of inferences. Candidates must be taught to utilize computer in various phases of this course and to be familiar with various analytical software. Emphasis must be placed on educational and practical application of basic statistical concepts in various educational disciplines.

**EDM 712: - Issues and Trends in Mathematics Education  
(3 Units)**

Current issues and trend in mathematics education through review of research activities and new programmes in mathematics education. Analysis and evaluation of innovations in mathematics education, current issues, problems and prospects.

**EDM 732:- Innovations in School Mathematics II 3 Units**

In addition to the content of EDM 632 emphasis will be laid on improvisation and production of instructional materials.

**EDM 751: - Directed Individual Study I                      3 Units**

Students will acquire training in independent research study. Students are expected to work on some research topic of interest and give a seminar on the work.

**EDM 752: - Directed Individual Study II                      3 Units**

Students will acquire training on fundable proposal writing and independent research study. Students are expected to write some fundable proposal on some research topic of interest and give a seminar on the work.

**MTH 803: - Real Analysis    3 Units**

Measures and Integration. Outer measures. Lebesgue Measure. Basic properties of Banach and Hilbert Spaces. Operators. Duality. Basic theorems in functional analysis, Classical Banach spaces. Special theory of operators in Hilbert spaces.  $L_p$  space as a Hilbert space. Banach algebras. Gelfand theory, compact operators. Examples and applications to classical analysis.

**MTH 805: - Partial Differential Equation I                      3 Units**

Basic examples of linear partial differential equations and their fundamental equations and their fundamental solutions. Existence and regularity of solutions ( local or global) of the Cauchy problems: boundary value problems and mixed boundary value problems. The fundamental solutions of their partial differential equations.

**MTH 807: –Advance Methods of Applied Maths. 3 Units**

The emphasis will be on advanced methods of solution rather than theory of ordinary and partial Differential equations. Power and product series and special functions, contours integral representation, integral transforms, conformal mapping. Wiener-Hopf techniques.

**MTH 804: - Complex Analysis**

**3 Units**

Geometric interpretation of derivatives, Conformal mapping, Mobius transformation, Sterographic projection and sets of points on the Riemann Sphere. Periodic Functions, Weierstrass Functions and Elliptic curves. Modular forms, Algebraic Functions, Riemann and Covering Surfaces and discontinuous groups of Linear transformation. Automorphic forms

**PGC 701: Synopsis and research grant writing (3 Units)**

Identification of types and nature of grant and grant writing; mining of grant application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant applications structures and contents and writing of concept notes, detailed project description, budgeting and budgeting defense. Project justification, review of critical problems, principles of scientific research, concepts of hypothesis formulation and testing, aims and objectives, essentials of literature review, methodology, experimental design, SWOT analysis, work plan, budgeting, expected outcome, beneficiary, cost benefit analysis, overall contributions to society. Study of sample grants writings in various forms and writing of mock research and other grants. Identification of University of Nigeria Synopsis structure and requirements (Introduction, methodology and results). Determining the content of each subunit of the synopsis. Steps in the writing of the synopsis from project report/dissertation/thesis. Structural and language issues. Common errors in synopsis writing and how to avoid them. The role of the student and the supervisor in the production of the synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution-based interactive workshop to be organized by the school of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected expert

**EDM 751: Ph.D Seminar I (Seminar on Mathematics Education At Proposal Stage) - 3 Credit Units**

Discussion and presentation of reports on selected proposal topic by each student in a chosen area of Mathematics Education as approved by the Department. The course shall be examined by means of a **Proposal Defense**.

**EDM 752: Ph.D. Seminar II (At Completion of Thesis Before faculty Seminar) – 3 Credit Units**

Presentation of complete reports on selected Thesis topic by each student in a chosen area of Mathematics Education as approved by the Department. The course shall be examined by means of a detailed discussion of the completed thesis. Emphasis will be on appropriateness of issues raised in the background to the topic; Relevance of literature; Field activities; Data analysis and Results, among others.

## **INTEGRATED SCIENCE EDUCATION PROGRAMME**

### **PHILOSOPHY**

Considering the role of Science and Technology in the social and economic advancement of a nation, the necessity to train high level human power in Science Education cannot be over emphasized. The philosophy of postgraduate programme in Integrated Science Education is the development of high level professional educators/teachers who understand the basic concepts of science as a discipline and are able to breakdown the artificial compartmentalization of science so as to see science as a trans-disciplinary domain of human activity. The Integrated Science perception of science enables the specialist to participate in human capital development of a category of science teachers who operate at the basic education level where science is presented to the learners in its unity of purpose and methodology thereby avoiding early specialization. The nation as managers of educational institutions, researchers, and Science Education leaders. The M. Ed/Ph.D degree programmes in Integrated Science Education are specifically designed to enhance the quality of Integrated Science Teachers and Educators towards the actualization of this philosophy and objectives of Basic science education at the primary and junior secondary school levels of Nigeria's education system.

### **OBJECTIVES OF THE PROGRAMME:**

Generally, the higher degree programmes in Integrated Science are designed to prepare holders of Masters and Ph.D Degrees in Integrated Science Education to provide effective academic and administrative leadership in research and teaching at all levels of education and training. Specifically, the M.Ed/Ph.D (Integrated Science Education) programmes are designed to achieve the following objectives:

- (i) raising the development of professional expertise of students in Integrated Science Education;
- (ii) removing the lid on Integrated Science which is being perceived as a science teacher education programmes that limits the clientele to first degree.
- (iii) further development of knowledgeable scholars who would provide leadership in professional practice and intellectual competence in Integrated Science Education at tertiary level;
- (iv) Increase production of Integrated Science Educators who are knowledgeable in and committed to the implementation of our national policy on Science Education at the basic education levels;
- (v) Increase production of competent researchers and innovators in science education theory and practice in Integrated Science.
- (vi) Further production of Integrated Science Educators who can propel social change through Science Education both intellectually and attitudinally, while propagating appropriate professional skills, values, and world views;
- (vii) producing Integrated Science Educators who are committed to reform in science education delivery through effective application and utilization of ICT in both national and global contexts.

### **JOB OPPORTUNITIES:**

Successful graduates of the above programmes have ample teaching opportunities with various ministries of education, research institutes, Universities, Colleges of Educations, Polytechnics or private schools in Nigeria or elsewhere.

## **M.Ed. INTEGRATED SCIENCE EDUCATION**

### **ADMISSION REQUIREMENTS:**

The criteria for admission into the Master's degree programme (M.Sc.(Ed ) in Integrated Science shall be as follows:

- (i) Candidates who hold Bachelor's degrees in Integrated Education from an approved university must obtain a minimum of second Class (Honours) lower division with a CGPA of 3.5.0 for an academic programme.
- (ii) Candidates with HND in Biology or Chemistry or Physics from approved polytechnics must in addition have a PGDE and obtain a minimum of Credit level pass with a CGPA of at least 3.5.0
- (iii) Evidence of NYSC discharge certificate or exemption/exclusion certificate is also required.
- (iv) In addition, the candidate will undergo a screening exercise in the University and Department of Science Education

### **EXPECTED DURATION OF PROGRAMME:**

- i. A full time Masters programme should run for a minimum of 4 semesters and a maximum of 6 semesters
- ii. Part-time Masters programme should run for a minimum of 6 semesters and a maximum of 8 semesters,
- iii. For extension beyond the specified maximum period, a special permission of University Senate shall be required.

### **REQUIREMENTS FOR GRADUATION:**

To be awarded a Masters degree in Integrated Science Education, candidates must pass a minimum of 36 credit units courses made up as follow:

- i. Minimum core courses of 10 units
- ii. Area of specialization minimum of 20 units
- iii. M.Ed Project 6 units
- iv. A student shall present at least one seminar, submit and defend a research dissertation
- v. A student for Master degree in Integrated Science Education programme shall carry out research in a relevant area of specialization and submit an acceptable research dissertation (6 units) which must be defended before a panel of external and internal examiners.

<b>STRESS AREAS</b>	<b>Codes</b>
Foundation Courses	0
Issues/Trends	1
Evaluation	2
Innovation	3
Curriculum	4
Seminar	5
Methods/Materials	6
Research	9

## **MASTERS DEGREE PROGRAMME IN INTEGRATED SCIENCE EDUCATION FIRST SEMESTER**

<b>Course Code</b>		<b>Credit Unit</b>
PGC 601	Applications of ICT in Research Methodology	3
RME 601	Research Methods in Education	2
RME 603	Statistical methods in Educational Research	3
EDS 641	Curriculum Development, Evaluation & Innovation.	3
EDS 605	Foundations of Science Education	2
EDU 613	Psychology of Learning	2
EDI 661	Methods and Material for Integrated Science Instruction/Teaching	2
CHM 401	Advanced Inorganic Chemistry II	2
PSB 673	Techniques in plant Ecology	3
<b>Total</b>		<b>22</b>

### **SECOND SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Unit</b>
RME 604	Advanced Statistical Methods in Education	2
EDS 636	Science, Technology, Society and Development	2
EDS 628	Issues and Trends in Science Education	2
EDS 624	Science Education and Disadvantaged Groups	2
PSB 666	Ecosystem Pollution Ecology	3
PHY 394	Workshop Course II (Electronics)	2
CHM 422	Advanced Organic Chemistry	2
ZEB 654	Ecology of Tropical Systems	3
<b>Total</b>		<b>18</b>

### **THIRD AND FOURTH SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Unit</b>
<b>PHY 393</b>	<b>Workshop Course I (Mechanical)</b>	<b>2</b>
<b>ZEB 659</b>	<b>Ecosystem Management</b>	<b>3</b>
EDI 690	Master's Research Project in Integrated Science	<b>6</b>
EDS 651	Graduate Seminar in Science Education	3
<b>Total</b>		<b>14</b>

### **PhD PROGRAMME IN INTEGRATED SCIENCE EDUCATION**

#### **Duration of Doctoral programme (after master's degree)**

Full-time	A minimum of 6 semesters
	Maximum of 10 semesters
Part-time	A minimum of 8 semesters
	Maximum of 12 semesters

#### **First semester**

<b>Course code</b>	<b>Course Title</b>	<b>Credit Unit</b>
RME 701	Advanced Research methods II	3



EDU 703	Information and communication technology (ICT) II	3
ZEB 721	Advances in Epidemiology, Public Health and Control of Parasitic Diseases	3
CHM 617	Selected Topics in Physical Chemistry	2
EDI 751	Ph.D Seminar I in Integrated Science Education	3
PGC 701	Synopsis and Grants writing	3
<b>Total</b>		<b>17</b>

### Second Semester

Course code	Course Title	Credit Unit
RME 702	Advanced Educational statistics II	3
PHY 755	Experimental Study of Solar Energy	3
ZEB 752	Advances in Ecosystem Management	3
EDI 752	PhD seminar II in Integrated Science Education	3
<b>Total</b>		<b>12</b>

### Third to Fifth Semester

Independent Study, Proposal, Field Study, Data analysis and Report Writing.

### Sixth Semester

Course code	Course Title	Credit Unit
EDI 790:	PhD Thesis	10
<b>Total</b>		<b>10</b>

### COURSE DESCRIPTION

#### **RME 601: Research Methods in Education (2 Units)**

Types of Research, methods and data; types of instruments; types of procedures for methods of data analysis; application of computer in data analysis; presentation and conclusions.

#### **RME 604: Statistical Methods in Education (2 Units)**

Review of Basic statistical concepts, descriptive, parametric, inferential and non-parametric statistics; t-statistic, ANOVA, ANCOVA, Regression analysis, chi-square and statistical techniques for post-hoc analysis; application of computer in statistical analysis; meaning and results of statistical analysis.

**EDS 641: Curriculum Development, Evaluation and Innovation in Science Education (3 Units)**

Different views on curriculum and their implications for science curriculum examination of the major curricular efforts in Nigeria, in the USA, in the UK and Eastern block country; practical experiences in the development of a chemistry curriculum. The role of curriculum in National Development, government participation development. Curriculum implementation in view of the national philosophies curriculum for contemporary development. Change, change models and the curriculum. Determinants of curriculum strategies for affecting curricular innovations. Formative and Summative evaluation in curriculum development. Techniques of curriculum evaluation, problems and prospects of curriculum evaluation in a contemporary world. Case studies of curriculum evaluation. Models of curriculum evaluation.

**EDS 605: Foundations of Science Education (2 units)**

Philosophy of science: meaning and nature of science, scientific knowledge, processes, attitudes and ethics. The nature and rationale for science education. Philosophical views of Thomas Kuhn, Karl Popper, James Brunner et cetera. Science Education as a discipline: history of science education and development of science education programmes in Nigeria.

**EDS 618: Issues and Trends in Science Education (2 units)**

Gender, language, cultural/environmental, teaching/learning, psychosocial and entrepreneurial issues in science education. Science and national development. Trends in students' enrollment/achievement and teacher- education.

**EDS 624: Science Education and Disadvantaged Groups (2 Units)**

Conception of science for all and children with special needs: visual impaired, speech and hearing difficulties. Provision of science programmes/ softwares for the disadvantaged groups.

**EDS 636: Science, Technology, Society and Development (2 Units)**

Implications of the study of science on the development of society in the relevant social, political and economic advancement; contemporary scientific and technological development in selected countries including Nigeria.

**EDS 651: Graduate Seminar in Science Education (3 Units)**

Study, discussion and debate of selected topics/issues in Integrated Science education. Survey, analysis or research and development in the field. Preparation and presentation of individual projects and reports on different topics/issues relating to Integrated Science education.

**EDI 661: Methods and Materials for Integrated Science  
Instruction/ Teaching (2 Units)**

Materials and resources necessary for Integrated Science teaching; role of integrated science laboratory and media in integrated science teaching. Management of integrated science teaching materials and personnel

**EDI 690: M.Ed Research Project in Integrated Science  
Education (6 Units)**

Selection and completion of a project in Integrated Science Education under the guidance of a supervisor and presentation of the project report.

**PGC 601: Applications of ICT in Research methodology  
(3 Units)**

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study from African and Western perspectives. Major steps in research: Selection of Problem, literature review, design, data collection, analysis and interpretation, conclusions. Study of various research designs, historical, case studies, survey, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis, and result presentation. Essentials of spreadsheets, internet technology, internet search engines, statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypothesis formulation and testing, organization of research and report writing. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the school of postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**PGC 701: Synopsis and Grants writing (3 Units)**

Identification of types and nature of grant and grant writing; mining of grant application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant applications structures and contents and writing of concept notes, detailed project description, budgeting and budgeting defense. Project justification, review of critical problems, principles of scientific research, concepts of hypothesis formulation and testing, aims and objectives, essentials of literature review, methodology, experimental design, SWOT analysis, work plan, budgeting, expected outcome, beneficiary, cost benefit analysis, overall contributions to society. Study of sample grants writings in various forms and writing

of mock research and other grants. Identification of University of Nigeria Synopsis structure and requirements (Introduction, methodology and results). Determining the content of each subunit of the synopsis. Steps in the writing of the synopsis from project report/dissertation/thesis. Structural and language issues. Common errors in synopsis writing and how to avoid them. The role of the student and the supervisor in the production of the synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution-based interactive workshop to be organized by the school of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**RME 701: Advanced Research Methods II (3 Units)**

The concept and nature; scientific processes in research; problem definition, variable identification; sources of research topics, theory construction and hypotheses formulation; techniques for literature review; principles of design, instrumentation, data collection, techniques for data analysis and presentation of results. Candidates must be introduced to computers and data analysis; analytical software and techniques in education. The orientation must be practical throughout as candidates are guided prepare tentative research proposals they must present and defend individually in class; techniques of research reporting; and research proposal writing.

**RME 702: Advanced Educational Statistics II (3 Units)**

Concepts of educational statistics; the role of statistics in education; descriptive statistics and the various areas of application in education; classroom data, school records, school demography, social relations in school; school administration and finances; Inferential statistics; population and sampling theory; non-parametric statistics, types and applications, types, applications and limitations. The nature of parametric statistics, types and applications in education, statistical models in education, application and limitations (correlation, univariate and multivariate analysis of educational data), the nature of significant tests, problems of inferences. Candidates must be taught to utilize computer in various phases of this course and to be familiar with various analytical software. Emphasis must be placed on educational and practical application of basic statistical concepts in various educational disciplines.

**EDU 703: Information and Communication Technology II  
(3 Units)**

In-depth knowledge of skills and techniques of data processing in education. Overview of sources, storage, retrieval and dissemination of data/information. Programme design and management of data; Management of data bank. General problem solving with the use of information technology. Hands-on experience should be emphasized.

**EDI 751: Ph.D Seminar I in Integrated Science Education**

Discussion and presentation of reports on selected proposal topic by each student in a chosen area of Educational Research, Measurement and Evaluation as approved by the Department. The course shall be examined by means of a **Proposal Defense**.

**EDI 752: Ph.D Seminar II in Integrated Science  
Education (3 Units)**

Presentation of complete reports on selected Thesis topic by each student in a chosen area of Educational Research, Measurement and Evaluation as approved by the Department. The course shall be examined by means of a detailed discussion of the completed thesis. Emphasis will be on appropriateness of issues raised in the background to the topic; Relevance of literature; Field activities; Data analysis and Results, among others.

**EDI 790: PhD Thesis (10 Units)**

Candidates are required to demonstrate research competencies by selecting a thesis topic in their relevant areas of specialization. The research is carried out by the individual student under the guidance of a competent supervisor according to graduate school requirements. The candidate is expected to make some significant contributions to knowledge. The Thesis is defended before an appropriately constituted examining committee chaired by the Head of the Department. The External Examiner's verdict shall override all other decisions.

**EDUCATIONAL RESEARCH, MEASUREMENT AND EVALUATION  
PROGRAMME AREA**

**Philosophy**

The philosophy of the postgraduate programme in Educational Measurement and Evaluation is the development of professional educational assessment experts and educators, who are social engineers of change through Psychometrics or Educational Measurement and Evaluation (M & E), either as professional teachers, researchers or managers of educational institutions and end-user organizations.

**Aims and Objectives**

The aims and objectives of the M&E Postgraduate Programme are to:

- (i) develop professional expertise of students in educational M&E.
- (ii) develop knowledgeable scholars who will provide leadership in professional practice and intellectual competence in educational M&E.
- (iii) produce educators who are knowledgeable in and committed to the implementation of the National Policy on Education.
- (iv) develop competent researchers in educational M&E theory and practice for Nigeria education system.
- (v) empower M&E educators who can propel social change through M&E practices both intellectually, in attitudes, skills, values and world views.
- (vi) produce M&E educators who can give Nigerian education a national identity while making it relevant in a global context.

(vii) to produce M&E experts who would work to eliminate the many ills in examinations thereby improve the credibility and acceptability of Nigeria's National examinations

### **Job Opportunities**

Successful graduates of the above programme have ample teaching opportunities with various ministries of education, research institutes, Universities, Colleges of Educations, Polytechnics or private schools in Nigeria or elsewhere in the world. They also have job opportunities in the various national and international examination bodies that assess learning outcomes for various purposes.

### **Admission requirement for Master's Degree**

Candidates who hold Bachelor's degrees from approved University in various disciplines must obtain a minimum of second class lower division with a CGPA of 3.5/0. Candidates who hold HND certificates and PGDE are eligible for admission into M.Ed programme. Candidates for Ph.D programme must have obtained their Master's Degree with CGPA of 4.0 to be eligible to the Ph.D programme.

<b>Stress Area</b>	<b>Code</b>
Research	0
Issues and Trends	1
Psychometrics/Measurement	2
Assessment /Evaluation	3
Computer Applications	4
Seminar	5
Practicum	6
Project/Thesis	9

## **M.Ed IN EDUCATIONAL RESEARCH, MEASUREMENT & EVALUATION**

### **FIRST YEAR**

#### **FIRST SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
PGC 601	Applications of ICT in Research Methodology	3
RME601	Research Methods in Education	2
RME 603	Statistical Methods in Educational Research	3

RME 625	Introduction to Measurement Theory	2
RME 631	Formative and Summative Evaluation of Achievement And Programmes	2
RME 633	Principles and Techniques of Classroom Assessment	2
	<b>Total</b>	<b>14</b>

## **SECOND SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
RME 622	Experimental Research Design	2
RME 604	Advanced Statistical Methods in Education	2
RME 612	Foundations of Educational Measurement and Evaluation	2
RME 622	Educational Measurement and Test Construction	3
RME 632	Programme Evaluation	2
RME 642	Data Management with Computer I	2
RME 662	Practicum in Educational Assessment	2
	<b>Total</b>	<b>15</b>

## **SECOND YEAR**

### **THIRD AND FOURTH SEMESTERS**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
RME651	Graduate Seminar in Educational Measurement and Evaluation	3
RME 690	M.Ed Research Project	6
	<b>Total</b>	<b>9</b>

**Grand Total (38)**

## **Ph.D PROGRAMME IN EDUCATIONAL RESEARCH, MEASUREMENT & EVALUATION**

### **FIRST SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
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RME 701	Advanced Research Methods II	3
EDU 703	Information and Communication Technology II	3
RME 721	Measurement Theory	3
RME 731	Project Monitoring & Evaluations	3
RME 751	Seminar on Advances in Educational Measurement	3
PGC 701	Synopsis and Grants Writing	3
	<b>TOTAL</b>	<b>18</b>

### **SECOND SEMESTER**

<b>Course Code</b>		<b>Units</b>
RME 702	Advanced Educational Statistics II	3
RME 704	Qualitative Research Methods in Education	3
RME 724	Multivariate Statistical Concepts in Education	3
RME 752	Seminar in Systems Evaluation	3
	<b>TOTAL</b>	<b>12</b>

### **THIRD SEMESTER – FIFTH SEMESTER**

Independent Study, Proposal, Field Study, Data analysis and Report Writing.

### **SIXTH SEMESTER**

<b>Course Code</b>	<b>Course Title</b>	<b>Units</b>
RME 790	Ph.D Thesis	10
	<b>TOTAL</b>	<b>10</b>
<b>Grand Total</b>		<b>(40)</b>



## **COURSE DESCRIPTIONS (MASTERS)**

### **PGC 601: APPLICATIONS OF ICT IN RESEARCH METHODOLOGY. 3 Credit units**

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study area from African and Western perspectives. Major steps in research: Selection of problem, Literature review, Design, Data collection, analysis and interpretation, conclusions. Study of various research designs, Historical, Case studies, Surveys, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tool relevant in every discipline for data gathering, analysis and result presentation. Essentials of spreadsheets, internet technology, and internet search engines. All registered masters degree students must attend a solution based interactive workshops to be organized by the school of post-graduate studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

### **RME 601: Research Methods in Education-2Credits Unit**

Types of research, method and data, types of instruments; types of procedures for data collection; methods of data analysis, application of computer in data analysis, presentation of results and conclusions.

### **RME 602: Experimental Research Design-2 Credits Unit**

Introduction to experimental research design (e.g. randomized designs, the latin square, the factorial design and the split plot design) and the use of relevant statistical techniques, including the analysis of variance (ANOVA) and the analysis of covariance (ANCOVA).

### **RME 603: Statistical Methods in Educational Research - 3 Credits Unit**

Review of Basic statistical concepts, descriptive, parametric, inferential and non-parametric statistics; t-statistic, ANOVA, ANCOVA, Regression analysis, chi-square and statistical techniques for post-hoc analysis; application of computer in statistical analysis; meaning and results of statistical analysis.

### **RME 604: Advanced Statistical Methods in Education - 2 Credits Unit**

Further work in statistics and their application to education. Multiple and multivariate regression, ANOVA, ANCOVA, MANOVA. Factor analysis, discriminant analysis, canonical correlation. Non-parametric statistics, including contingency tables. Interpretation of output of computer programmes in the statistics.

### **RME 612: Foundations of Educational Measurement and Evaluation 2 Credit Unit**

Historical, philosophical and sociological foundations of Educational measurement and evaluation within global, continental and national context. The course will also expose candidates to political and economic dimension of educational assessment.

**RME 622: Educational Measurement and Test  
Construction 3 Credits Unit**

Measurement, scale and scaling models, theory of measurement error; test construction procedures; item writing, analysis and assembly in achievement, aptitude and non-cognitive tests; reliability and validity of tests; practical work in test construction.

**RME 625: Introduction to Measurement Theory  
2Credit Units**

Classroom assessment, Concept, Principles and Models of Assessment. Other Assessment Systems: State, National, International Assessment systems and public examinations. Classical Test theory (CTT), Basic concepts in CTT, Basic tenets and Assumptions, Advantages and Limitations. Item analysis within classical test theory framework. Common statistics used in CTT framework

**RME 631: Formative and Summative Evaluation of  
Achievement and Programmes - 2 Credits Unit**

The concept of formative and summative evaluation as applied to cognitive, affective and psychomotor achievement of students in an educational programme. Evaluation of programmes, innovations, organizations and institutions

**RME 632: Programme Evaluation 2 Credits Units**

This course will deal with topics on meaning of program evaluation, assessing needs, program theory, implementation, assessing the impact, determining causation, reliability, variability and sensitivity in program evaluation, methodological constants and challenges in program, evaluation, utilization results, Paradigms, empowerment evaluation, transformation paradigm and models of evaluation.

**RME 633: Principles and Techniques of Classroom  
Assessment 2Credit Units**

Course will focus on distinguishing basic concepts, purpose and levels of assessment, formative and summative assessment, models of formative; taxonomy of educational measures, Continuous assessment, development, administration and scoring of instruments for assessing cognitive, affective and psychomotor behaviours tests – achievement, intelligence and aptitude tests Psychometric properties of instruments; Interpretation of test scores, Cultural, social and ethical considerations, item/test bias.

**RME 642: Data Management with Computer I-2 Credits Unit**

This course will provide students with skills in data analysis using SPSS. The SPSS environment – inputting, aggregating and transforming data. Analyzing data – generating reports, descriptive statistics, comparing means, Generalized linear models, Correlation and Regression analysis, data reduction, scale (reliability).

**RME 651: Seminar in Educational Measurement and  
Evaluation 2 Credit**

Readings, assignments, discussion and presentation of reports on selected on selected topics by each student in one chosen area of specialization as approved by the Department. The course shall be examined by of a detailed discussion of the completed project. Emphasis will be on appropriateness of issues raised in the background to the topic; Relevance of literature; Field activities; Data analysis and Results, among others.

**RME 662: Practicum in Educational Assessment**

**2Credit Units**

Laboratory and field based planning, development, trail compilation, norming and validation of educational test in the cognitive, affective and psychomotor domains; field practices with test and scales already developed, principles of test review. Differential emphasis will be made to reflect the special interest of students such as in curriculum development, guidance and counselling, administration and research.

**RME 690: Research Project**

**6 Credits Unit**

Selection and completion of a project under the guidance of a supervisor and presentation of the completed project report.

**COURSE DESCRIPTIONS (Ph.D)**

**PGC 701 Synopsis and Grants Writing -2 Credit Units**

Identification of types and nature of and grant writing; mining of grants application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant application structures and contents and writing of concept notes, detailed project description, budgeting and budget defense. Study of sample grant writings in various forms and writing of mock research and other grants. Identification of University of Nigeria synopsis structure and requirements (Introduction, Methodology and Results). Determining the content of each sub-unit of the synopsis. Steps in writing of synopsis from the Dissertation/Thesis document. Structural and language issues. Common errors in synopsis writing and strategies for avoiding them. The roles of the student and the supervisor in the production of a synopsis. Writing of Mock synopsis. All registered Ph.D students must attend a solution based interactive workshop to be organized by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**RME 701 Advanced Research Methods in Education II**

**3 Credit units**

The concept and nature of research; scientific processes in research; problem definition, variable identification; sources of research topics; theory construction and hypotheses formulation; techniques for literature review; principles of design, instrumentation, data collection, techniques for data analysis and presentation of result.. Candidates must be introduced to computers and data analysis; analytical software and techniques in education. The orientation must be practical throughout as candidates are guided to prepare tentative research proposals they must present and defend individually in class; techniques of the research reporting, and research proposal writing

**RME 702: Advanced Educational Statistics II- 3 Credit Units**

Concepts of educational statistics; the role of statistics in education; descriptive statistics and the various area of application in education; classroom data, school records, school

demography, social relation in school; school administration and finances; inferential statistics; population and sampling theory; nonparametric statistics in education; hypotheses assumptions, types applications and limitations. The nature of parametric statistics, types and application in education; statistical models in education, application and limitations (correlation, univariate and multivariate analysis of educational data), the nature of significant test, problems of inference. Candidate must be taught to utilize computer in various phase of this course and be familiar with various analytical software. Emphasis must be placed on educational and practical application of the basic statistical concepts in various educational disciplines.

**EDU 703: Information and Communication  
Technology II 3 Credit Units**

In-depth knowledge of skills and techniques of data processing in education. Overview of sources, storage, retrieval and dissemination of data/ information. Programme design and Management of data bank. General problem solving with the use of information technology. Hands-on experience should be emphasis.

**RME 704: Qualitative Research Methods in Education  
3 Credit Units**

The course will focus on nature of qualitative research, approaches, methods, sampling and selection in qualitative research, qualitative analysis and presenting qualitative research.

**RME 721: Measurement Theory 3 Credit Units**

Item response theory (IRT), Basic concepts in IRT, Basic tenets and Assumptions, Advantages and Limitations, Models of IRT. Applications of IRT to Item bias or DIF, Deviant answer patterns, Computerized Adaptive Testing (CAT). Applications of IRT in: Item analysis and test construction, Estimation of item/person parameters, Test and item information. Model-data fit. Test Equating, Some basic data collection designs for equating studies. Generalizability Theory. Basic concepts of G theory. Generalizability designs. Kinds of measurement errors, Conditional error variance.

**RME 724: Multivariate Statistical Concepts in  
Education 3 Credit Units**

Multivariate regression, Multivariate Analyses of Variance (MANOVA), Multivariate Analysis of Covariance (MANCOVA). Cluster analysis; Factor Analysis, Structural Equation Modelling: Path Analysis.

**RME 731: Project Monitoring and Evaluation 3 Credit Units**

An overview of meaning of project monitoring and evaluation, planning for monitoring and evaluation, designing a monitoring and / or evaluation process, collecting information, analyzing information, impact analysis, project evaluation guidelines, techniques of project appraisal, principles of project appraisal, methodological framework for project evaluation, methods/ criteria of project evaluation

**RME 751: Seminar on Advances in Educational  
Measurement I 3 Credit Units**

Discussion and presentation of reports on selected proposal topic by each student in a chosen area of Educational Research, Measurement and Evaluation as approved by the Department. The course shall be examined by means of a **Proposal Defense**.

**RME 752 Seminar on Systems Evaluation II – 3 Credit Units**

Presentation of complete reports on selected Thesis topic by each student in a chosen area of Educational Research, Measurement and Evaluation as approved by the Department. The course shall be examined by means of a detailed discussion of the completed thesis. Emphasis will be on appropriateness of issues raised in the background to the topic; Relevance of literature; Field activities; Data analysis and Results, among others.

**RME 790: Ph.D Thesis 10 Credit Units**

Candidates are required to demonstrate research competencies by selecting a thesis topic in their relevant area of specialization. The research is carried out by the individual student under the guidance of competent supervisor according to graduate school requirements. The candidate is expected to make some significant contributions to knowledge. The thesis is defended before an appropriately constituted examining committee chaired by the Head of the department. The external Examiner's verdict shall override all other decisions.