UNIVERSITY OF NIGERIA, ENUGU CAMPUS

CENTRE FOR ENVIRONMENTAL MANAGEMENT & CONTROL (CEMAC)

PGD, M.Sc & Ph.D DEGREE PROGRAMMES IN ENVIRONMENTAL MANAGEMENT AND CONTROL AND M.Sc DEGREE PROGRAMME IN DISASTER RISK MANAGEMENT

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INTRODUCTION

The Centre for Environmental Management and Control offers Postgraduate Programmes leading to *Postgraduate Diploma* [PGD], *Master of Science* [M.Sc.] and *Doctor of Philosophy* [Ph.D] degrees in Environmental Management and Control and Master of Science [M.Sc] Degree Programme in Disaster Risk Management.

PHILOSOPHY

The philosophy of the programme is to develop a sustainable, multi-disciplinary reservoir of knowledge and skills for appropriate responses to environmental problems and which seeks to foster and maintain a broad international appeal and strong external links.

OBJECTIVES

Towards the realization of the above philosophy, the objectives of the programme are to:

1. foster and enhance multi-disciplinary research and field studies on environmental issues that are socially relevant and people focused;
2. produce M.Sc and Ph.D graduates with a high level of multi-disciplinary environmental problem-solving perspective necessary to bring innovative solutions to environmental problems at local, state, federal and international levels;
3. produce highly skilled environmentalists capable of facing a broad spectrum of challenges in the areas of environmental management and control;
4. facilitate and encourage collaborative studies between students of the centre and other national and international research institutions and organizations.

OBJECTIVE IN MASTER OF SCIENCE DEGREE PROGRAMME IN DISASTER RISK MANAGEMENT

1. To foster multi-disciplinary training and research on disaster risk management;

2. To expose candidates to specific field studies on hazard incidences, their causes, characteristics and consequences as well as the procedures and tools for addressing them;

SCOPE

The programmes are multi-disciplinary in nature involving aspects of environmental regulation and legislation, monitoring and management as well as environmental economics and policy. It also spans through disaster risk valuation to disaster mitigation/reduction and management.

EMPLOYMENT OPPORTUNITIES

A graduate of the programme is an environmentalist, whose expertise will be very much sought after by the government, oil industries, manufacturing, mining, agricultural and construction industries. He can also find employment in educational and research institutions.

AREA OF SPECIALIZATION

The area of specialization is Environment Management for M.Sc in environmental management & Control and Disaster Risk Management for M.Sc in Disaster Risk Management.

STRESS AREAS IN ENVIRONMENTAL MANAGEMENT AND CONTROL

Environmental Resources and Management	1
Environmental Regulation and Monitoring	2
Environmental Economics, Policy and Legislation	3
Research Techniques and Methods	4
Seminars	5
Project/Dissertation/Thesis	9

STRESS AREAS IN DISASTER RISK MANAGEMENT

Environmental Systems regulation and monitoring	1
Disaster Risk Policy, Legal, Economic and Social Issues	2
Disaster Risk Management tools and techniques	3
Research Techniques and Methods	4
Seminar	5
Project	9

ENTRY REQUIREMENTS

The following may qualify for admission:

Postgraduate Diploma Programme [PGD]

Graduates of the University of Nigeria or other recognized universities who have obtained a bachelors degree with a minimum of third class honours and Holders of Higher National Diploma [HND] from recognized institutions, with a minimum of upper level credit or its equivalent in relevant areas.

Master of Science (M.Sc.) Environmental Management and Control

a. Graduates of the University of Nigeria or other recognized universities who have obtained the approved degree, with a minimum of second class honours lower division or its equivalent in any of the relevant disciplines.

b. Candidates with university honours degree who also hold the PGD in Environmental Management and Control of the University of Nigeria or other recognized universities with a minimum GPA of 3.5 on a 5 - point scale [or 3.00 on a 4-point scale].

MASTERS OF SCIENCE DEGREE PROGRAMME IN DISASTER RISK MANAGEMENT

The following may qualify for admission into the Master of Science Degree in Disaster Risk Management

a. Graduates of the University of Nigeria or other recognized universities who have obtained an approved bachelor's degree with a minimum of second-class honours or its equivalent in any of the relevant disciplines

b. Candidates with university honours degree who also hold the PGD in Disaster Risk Management or Environmental Management and Control, or equivalent qualifications, of the University of Nigeria or other recognized universities with a minimum GPA of 3.5 on a 5 point scale or 3.00 on a 4 point scale.

c. Candidates who possess HND in related disciplines with at least a credit level pass from recognized institutions and at least a credit pass in Postgraduate Diploma in Disaster Risk Management or Environmental Management and Control of the University of Nigeria in the relevant areas.

d. Such candidates must in addition satisfy the basic and higher degree requirements for admission into the University of Nigeria.

Doctor of Philosophy (Ph.D) Programme in Environmental Management and Control

Graduates of the University of Nigeria or other recognized universities who have obtained the degree of M.Sc. in Environmental Management and Control or its equivalent with a minimum mode of study of 2/3 by research and 1/3 by course work. A minimum GPA of 3.50 on a 5-point scale or 3.00 on a 4-point scale, is required.

M.Sc./Ph.D

Graduates of the University of Nigeria or other recognized universities who have obtained the degree of M.Sc. in Environmental Management and Control or its equivalent *through comprehensive course work* and whose GPA is at least 3.50 on a 5-point scale or 3.00 on a 4-point scale. The candidate so admitted will be required to write an examinable dissertation during the first semesters of his/her study and obtain at least a grade of "B" before proceeding to the Ph.D programme.

MODE OF STUDY

Postgraduate Diploma

The Postgraduate Diploma is for graduates of the University of Nigeria and other recognized universities whose qualifications are at variance with the entry qualifications

for master's degree work. The mode of study is by course work to be examined in written papers and project work embodied in a project report.

M.Sc Programme in Environmental Management and Control

The M.Sc. programme of the Centre for Environmental Management and Control is structured to accommodate one option: *the project report option*.

The mode of study for Master in Disaster Risk Management (MDRM) is by course work and research with course work predominating over research. This mode of study has a requirement of 2/3 by course work and 1/3 by research. The examination consists of a Project Report which does not need to be defended orally before an external examiner.

The Project Report Option

The mode of study is by course work and research, with course work predominating research. This option has a minimum mode of study of 2/3 by course work and 1/3 by research. The examination consists of a *Project Report* which does not need to be defended orally before an external examiner.

Ph.D Programme in Environmental Management and Control

This is a Ph.D programme with course work, where there is a preponderance of research over course work. The programme culminates in the submission of a *Thesis* which must be judged to make an original contribution to knowledge and also publishable.

The Academic Board of CEMAC requires that candidates must perform satisfactorily in two seminars before they can be certified ready for the Ph.D defense.

DURATION OF STUDY

PGD	-	Full time	-2 semesters minimum and 4 semesters maximum.
		Part time	-4 semesters minimum and 6 semesters maximum
M.Sc	-	Full time	-12 Calendar months minimum and 3 Calendar years maximum
		Part time	-18 Calendar months minimum and 5 Calendar years maximum
M.Sc (DRM)	-	Full time	-18 calendar months minimum and 3 calendar years maximum
		Part time	-24 calendar months minimum and 5 calendar years maximum
M.Sc/Ph.D		Full time	-3 Calendar years minimum and 5 Calendar years maximum
		Part time	-4 Calendar years minimum and 6 Calendar years maximum
Ph.D. Programme			
		Full time	-2 Calendar years minimum and 5 Calendar years maximum
		Part time	-3 Calendar years minimum and 6 Calendar years maximum

COURSES AND THEIR DISTRIBUTION

PGD PROGRAMME

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNITS
EMC 0611	Introduction to Environmental Science	2
EMC 0613	Introduction to Built Environment	2
EMC 0621	Introduction to Environmental Hazards and Control	1
EMC 0631	Introduction to Environmental Law	2
	ELECTIVES	4
	Total	**11**

ELECTIVES **UNITS**

Electives of 6 Units from the following courses:

EMC 0615	Water Resources in Environmental Management	2
EMC 0617	Physical Facilities and Environmental Management	2
EMC 0619	Management of Marine and Coastal Environments	2
EMC 0623	Introduction to Environmental Chemistry and Biology	2
EMC 0625	Air and Water Quality Standards	2
EMC 0627	Global Environmental Changes	2
EMC 0633	Population and the Environment	2
EMC 0635	Recreation, Tourism and Resource Management	2

SECOND SEMESTER

COURSE CODE	COURSE TITLE	UNITS
EMC 0612	Environmental Management and Regional Development	2
EMC 0614	Introduction to Land Resource Management	1
EMC 0642	Research Methods and Computer Applications	2
EMC 0644	Introduction to Geographic Information Systems [GIS]	2
EMC 0662	Project	4
	ELECTIVES	2
	Total	**13**

ELECTIVES **UNITS**

Elective of 2 Units from the following courses:

EMC 0616	Energy and the Environment	1
EMC 0618	Environmental Management and the Ecosystem	1
EMC 0622	Environmental Conservation and Preservation	2
EMC 0624	Waste Water Treatment	1
EMC 0626	Introduction to Environmental Pollution	2
EMC 0628	Introduction to Environmental Psychology	2
EMC 0632	Human settlements and the Environment	2
EMC 0634	Sustainable Development and the Environment	2
EMC 0636	Health and Safety Management	2

M.SC. PROGRAMME

FIRST SEMESTER

COURSE CODE	**COURSE TITLE**	**UNITS**
EMC 611	Overview of Environmental Systems and Environmental Management System	2
EMC 621	Pollution Control and Soil Conservation Methods	2
EMC 641	Environmental Management, Monitoring and Control Technique	3
EMC 615	Environmental Chemistry, Air and Water Quality	2
PGC 601	Research Methodology and Application of ICT in Research	3
EMC 619	Waste Management	2
	Semester Total	**14/24**

SECOND SEMESTER

COURSE CODE	**COURSE TITLE**	**UNITS**
EMC 653	Global Environmental Challenges and Priority Issues	2
EMC 627	Environmental Psychology and Policy Studies	2

EMC 651	Environmental Impact Assessment and Sustainability Studies	2
EMC 652	Environmental Epidemiology and Ecological Risk Management	2
EMC 662	Project	6
	Semester Total	**16/24**
	SESSION TOTAL	**30**

ELECTIVES

COURSE CODE	**COURSE TITLE**	**UNIT LOAD**
EMC 631	Environmental Law	2
EMC 613	Land Use, Rural and Urban Planning	2
EMC 645	Geographic Information Systems	2
EMC 633	Environmental Economics	2
EMC 651	Occupational Health and Safety	2

The candidates should select from any one of the elective course above.

COURSES

M. Sc (DRM) Programme ***Servicing Department***

1st Semester

DRM 611 - Land use and Environmental Systems - 2 units - *URP*
DRM 621 - Disaster Risk Policy - 2units - *CEMAC*
DRM 623 - Legal Issues in Disaster Risk Management - 2 units - *Law*
DRM 631 - Geographic Information System (GIS) and Remote Sensing (RS) in DRM - 2 units - *Geoinfromatics & Surveying*
DRM 641 - Research Methodology in DRM - 2 units - *CEMAC*
PGC 601 - Research Methodology and Application of ICT in Research – 3units
Total units - 13 units

2nd Semester

DRM 622 - Strategic Emergency Response & DRM - 2 units - *Medical Rehabilitation*
DRM 624 - Community Participation in Disaster Risk - 2 units - *CEMAC*
DRM 632 - EIA in Disaster Risk Management - 2 units - *CEMAC*
DRM 642 - Disaster Risk Valuation - 2 units - *Estate Management*

Total units - 8 units

3rd Semester

DRM 691 - Project/Dissertation - 6 units
DRM 651 - Seminar - 2 units - *CEMAC*
Elective - 2 units

Total units - 10 units

Each candidate is expected to select one elective from the following:-
DRM 613 - Flood Studies 2 units - *Soil Science*
DRM 615 - Climate Change & DRM " - *Geography*
DRM 625 - Disaster Trauma Management " - *Medical Rehabilitation*
DRM 627 - Public Health and Disaster Risk Management " - *Community Medicine*
DRM 629 - Occupational Hazards and Safety Management " - *Community Medicine*
DRM 633 - International Collaboration and Community Participation in DRM " - *CEMAC*

Grand Total - 31 units

COURSES AND THEIR DISTRIBUTION
Ph. D. PROGRAMME

FIRST SEMESTER

COURSE CODE	COURSE TITLE	UNITS

EMC 711	Advanced Environmental Impact Assessment	2
EMC 721	Advanced Environmental Quality Management Systems	2
EMC 741	Advanced Research Methods	2
EMC 781	Special Topics in Disaster Risk Reduction and Management	3
	Total	**9/30**

SECOND SEMESTER

COURSE CODE	**COURSE TITLE**	**UNITS**
EMC 752	Environmental Politics and Policy	2
EMC 791	Global Environmental Challenges	2
EMC 794	Environmental Modeling	2
PGC 701	Synopsis and Grant Writing	3
EMC 762	Thesis	12
	Grand Total	**21/30**

POSTGRADUATE DILOPMA (PGD) COURSE DESCRIPTIONS

EMC 0611: ***Introduction to Environmental Science - 2 units***
Introduction to environmental sciences; the concept of the ecology; ecosystems and their relevance to the environment; resources, human settlement, development and the environment; interplay of ecological and economic theories. The relationship between disciplines in environmental studies. Study and analysis of human settlements as ecosystems; the relevance of environmental management to the physical environment.

EMC 0612: ***Environmental Management and Regional Development - 2 units***
Basic principles of regional science, concepts of region, theories and processes of regional development. Regional imbalance, location theory, export multiplier and location quotient; human resources. Regional infrastructure and potentials. Strategies for regional development planning, regional development planning problems in Nigeria. Regional planning as a link between national planning and local planning. Case studies and application of regional planning theories to existing situations. Comparison of regional planning schemes in Nigeria and

selected African and developed countries.

EMC 0613: ***Introduction to Built Environment - 2 units***
Definitions of the environment, man-made environments. Built environment: structures, infra-structure, and their surroundings.

EMC 0614: ***Introduction to Land Resources Management - 2 units***
Meaning of land in social, agricultural, economic and legal theories. Demand and supply of land. Land resources in Nigeria; land use and the Nigerian economy. Competitive and complementary land uses; conflict and incompatibility. Land use economics. Land tenure and communication on the use of land. Rural and urban land uses and allocation, concepts of property rights. Land resources exploitation -renewable and non-renewable. Concepts of land development, redevelopment and sustainability. Environmental pollution and land degradation; land conservation.

EMC 0615: ***Water Resources in Environmental Management - 2 units***
Global water distribution; the hydrologic cycle; concept of water balance; Occurrence and movement of groundwater; water related environmental problems.

EMC 0616: ***Energy and the Environment - 1 unit***
Foundations of energy; energy flow and conservation; renewable and non-renewable energy. Health and environmental impact of energy use; remediation and environment. Risk analysis.

EMC 0617: ***Physical Facilities and Environmental Management - 2 units***
Space planning; the link between site and services, site services and town planning, cadastral services, street and parking services, mapping and marketing of sites; life cycle costing of environmental infrastructure, environmental asset management and tracking; Computer-Aided Facility Management (CAF) systems and software.

EMC 0618: ***Environmental Management and the Ecosystem - 1 units***
Introduction to a new approach to environmental management; the concept of ecosystem and biodiversity; properties of ecosystem relevant to environmental management; the conceptual toolbox; ecosystem approach to environmental management; The biological and ecological background; The human dimensions

EMC 0619: ***Management of Marine and Coastal Environments - 2 units***
Introduction to marine science; overview of the coastal environment; global climate and ocean systems; types and functions of coastal resources; coastal zone management framework; wetland and land use management issues; coastal pollution; coastal tourism; international coastal management; sustainable use of the marine environment.

EMC 0621: ***Introduction to Environmental Hazards and Control - 1 units***

Definitions and components of natural and man-made environments; pollution control measures; waste management and land use policy. Environmental hazards; causes and ecological consequences on the environment; the use of natural resources, e.g. water, air and land. Environmental planning problems and solutions.

EMC 0622: ***Environmental Conservation and Preservation - 2 units***
Objectives of environmental conservation and preservation; biodiversity; ecological systems and their interrelationships; endangered species, and other consequences of rapid resource depletion. Techniques and procedure for environmental conservation and preservation; legal aspects of conservation and preservation. International co-operation and developments in conservation and preservation. Preservation of historic and man made features/land marks; energy conservation; conservation planning; resource conservation planning and management; forestry management; wildlife management; grass land management; swamp management.

EMC 0623: ***Introduction to Environmental Chemistry - 2 units***
Introduction to environmental studies and pollution. Natural cycles of the environment: hydrological cycle, oxygen and nitrogen cycles. Air pollution and control: types, effects, monitoring and control. Global issues in air pollution: green house effect, depletion of ozone layer, acid rain and climate change. Water pollution and control: types of pollutants, and their effects, entrophication, water and waste treatment, water chemistry and analysis. Land pollution and control: municipal, industrial, agricultural waste and disposal, effects of pesticides and fertilizers on soil.

EMC 0624: ***Waste Treatment Management- 1 unit***
Introduction; **t**ypes of waste and effect on the environment. Roles of the environmental factors; management of waste treatment; hierarchy of waste management; waste prevention and control. Waste treatment units; types, physical, chemical and biological treatment processes. Choice of treatment processes; space requirements. The concept of sustainable water management.
Optimization of waste treatment management.

EMC 0625: ***Air and Water Quality Standards - 2 units***
Concepts and role of standardization; local and international standards organizations; air quality parameters and standards; water quality parameters and standards; standard test methods for air and water.

EMC 0626: ***Introduction to Environmental Pollution - 2 units***
Environmental pollution; sources and types of pollution: water, air, noise and thermal pollution; energy conservation and pollution/hazard; pollutants and their effects on the environment. The relationship between development, natural resources and the physical environment. Issues in the management of the physical environment; strategies and procedures for effective environmental pollution control; case studies in environmental pollution control.

EMC 0627: ***Global Environmental Changes - 2 units***

Nature of environmental system; concepts of system change; environmental change; physical and biological processes of environmental change; anthropogenic factors of environmental change; case studies

EMC 0628: ***Introduction to Environmental Psychology - 2 units***
Definition and history; territoriality, experimental studies of territories, personal space, privacy. Crowding and social interaction, consideration of social interactions in the design of buildings and institutions; cross-cultural comparison of dwellings in Nigeria; physical and human factors contributing to accidents; accident reduction in the environment; spatial aspects of sports and recreation.

EMC 0631: ***Introduction to Environmental Law - 1 unit***
Definition of environmental law; need for environmental law. Values and environmental law; interaction between values and law; law and balancing environmental values. Perspectives on environmental law: economic, social, cultural and scientific perspectives. Legal implications of environmental principles; sustainable development; depletion of ozone layer, global warming and climate change. Organic laws; major environmental laws; judicial decisions; nuisance, negligence; trespass; rule in Ryland and Fletcher.

EMC 0632: ***Human Settlements and the Environment - 2 units***
Evolution of human settlements; physical and socio-economic element of human settlement. Land tenure and uses for residential, commercial, agricultural, institutional and transportation purposes. Relationship between the natural and man-made environments; environment, ecology and management.

EMC 0633: ***Population and the Environment - 2 units***
Population and quality of natural environment; concept of sustainable environment; impact of population growth on land and sea resources; population, air pollution and climate change; relationship between population, consumption, and resource distributions; consumption and resource distribution; population, environment and energy; population and urbanization

EMC 0634: ***Sustainable Development and the Environment - 2 units***
Major socio-economic trends and global environmental problems; global economic inter-dependence, inequality and the environment; critical analysis of development paradigms and strategies; their environmental consequences; history of ideas and initiatives in sustainable development; basic concepts of environmental philosophy, economics and politics; contemporary patterns of production and consumption; urbanization, industrialization and sustainability; obstacles and opportunities for sustainable development. The Habitat Agenda and the Millennium Development Goal (MDG). Local Sustainable Development Programmes (SDP) e.g Ibadan and Enugu SDPs

EMC 0635: ***Recreation, Tourism and Resource Management - 2 units***
Definition of recreation; supply and demand for recreational resources. Recreational planning standards and strategies; indoor and outdoor recreation; local and national parks; countryside and forest recreational resource development. Management of recreational resources. Definition of tourism. Tourism and regional/national development. Elements of tourism; potential and

functional tourism resources in Nigeria. Development, management and organization of tourism. Development of tourist resort centres; design and implementation considerations.

EMC 0636: ***Health and Safety Management - 2 units***
Principles and impact of various sanitation processes in improving both rural and urban air and water quality; environmental impact assessment/analysis; industrial hygiene and toxicology; impact of industrial and agricultural exposures on health; principles of control of environmental hazards at work places; principles of ergonomics.

EMC 0642: ***Research Methods and Computer Applications - 2 units***
Basic research methods: data collection and collation; hypothesis testing; Introduction to univariate and multivariate statistical techniques in environmental management. Computer software and hardware appreciation; computer applications in research. Processing and graphical display of data: the Auto-CAD, ARC VIEW, MAP MAKER.

EMC 0644: ***Introduction to Geographic Information Systems (GIS) - 2 units***
Definition of Geographic Information System (GIS); basic concepts; data: spatial data, attribute data. History of GIS operations; basic concept of space; GIS data models: vector data model and raster data model. Data management: vector data input, spatial data editing, attribute data input and management. GIS applications.

EMC 0662: ***Project - 4 units***
A student is required to write a well researched project under the supervision of a supervisor. Choice of topic will also be guided by the supervisor.

M.Sc COURSE DESCRIPTIONS

FIRST SEMESTER

EMC 611: ***Overview of Environmental Systems and Environmental Management System - 2 unit***
Overview of environmental systems; concept of environmental systems; habitat and food chain as systems; man's relationship with the ecosystem; aquatic system; terrestrial systems: the planet as a system; urban environmental system – physical, social, economic; the rural environment,; environment/development imbalance; factors that influence changes in the environmental systems; natural environmental systems; geographical systems; atmospheric systems; hydrological systems.; Approaches to environmental management; management of geographical, atmospheric and hydrological systems. Economics and management of environmental qualities. Environmental ethics, the role of government in environmental management systems; the public and environmental management systems, cultural management approaches to environmental systems; Introduction to air, soil and water pollution – types, sources and impacts. Preventive systems. Control systems at source; collection, transportation and processing strategies. End of pipe versus proactive systems. Processes and kinetics of waste treatment technologies. Residue processing and disposal systems. On-site and off-site systems. Design of elementary engineering systems.

EMC 613: ***Land Use, Rural and Urban Planning - 2 unit***

The nature of land use; land use change. urban, rural, land use planning; land use, analysis and plan preparations; land use regulations; types and procedures. Endowment and resources: natural, technological and human. Problems and constraints to development. Resource inventories, resource management techniques, public control over land use, policies and issues. Urbanization and land use; the city as an integrated system of human environment. Urban land resource allocation problems. Urban growth management problems; management of new and expanding towns. Issues on rural settlement; rural land use studies. Rural settlement: forms, structure and growth patterns. Migration and rural population dynamics.

EMC 615: Environmental Chemistry, ***Air and Water Quality Management - 2 unit***

Environmental pollution emanating from chemical industries. Environmental impacts of crude oil prospecting, drilling, transportation, storage and refining. Pollution associated with coal mining: combustion, carbonization and processing. Pollution associated with the manufacture and use of agrochemicals. Land, water and air pollution emanating from other chemical industries: cement, beer and beverages, tanning and leather, dyes and pigments, pulp and paper, plastics, iron and steel, etc. Air quality management. Composition of the atmosphere; atmospheric structure; chemical and photochemical reactions in the atmosphere; types of air pollution, effects, monitoring and control; greenhouse effects/global warming; depletion of ozone layer; climate change. Water quality management: water pollutants, their sources and effects; water quality parameters and standards; water chemistry and analysis; design of water treatment plant; design of waste water treatment plant

EMC 619: ***Waste Management - 2 unit***

Classification of wastes; urban solid waste management. Contamination of land and water resources through pollutants; the prediction of movements of pollutants using geology, hydrology and hydrogeology models; restoration of contaminated land; improvement of waste management and disposal. Water and sanitation; management of degradable and non- degradable wastes; sewage and sludge management, toxic and hazardous wastes; waste management facilities. Waste management financing. Private Sector Participation (PSP) and public sector agencies. National policy and framework on waste management

EMC 621: ***Pollution Control and soil Conservation Methods - 2 unit***

Physical and natural environment; relationship between development and environment. Environment degradation: causes, type and processes. Rural and natural environmental degradation; urban environmental degradation. The concept of monitoring, its processes and techniques. Legal frameworks for environmental pollution control. Processes of pollution assessment, procedure of pollution monitoring. Case studies in global concerns – treaties, agenda, monitoring constraints; evaluation techniques and processes. Trends in monitoring and evaluation of soil conservation structures and processes. Methods of soil erosion control, predicting amount of soil loss using the universal soil loss equation. Revised universal soil loss equation, Water Erosion Prediction Package (WEPP), applicable in Nigeria. Relationships between soil loss and land productivity. Preparation and presentation of detailed soil loss map of an area as a mini projects.

EMC 629: ***Environmental Epidemiology and Ecological Risk Management - 2unit***

Microbiological aspects of soil and water resources; fresh water and marine microhabitats. Sources and types of water pollution: natural and man-made, Nitrates, pesticides and organic micro- pollutants, odour and taste, iron and manganese etc. Hardness, pathogens alga and algal toseins. Fadon and radioactivity and problems arising from water treatment, distribution and home plumbing systems, monitoring and removal of pathogens. Basic principles of epidemiology; epidemiology of communicable diseases; basic concepts and principles of control of communicable diseases; investigation and management of communicable diseases and epidemics; surveillance of communicable diseases.
Definitions and components of natural and man-made environments; air, water and land pollution; causes, consequences and remedies; the problems of waste disposal; soil erosion; floods and other natural catastrophyes; renewable and non-renewable resources; deforestation and desertification; environmental control and land use policy in Nigeria. Hazard and risk management constraints; local and global standards. Emergency relief and response to environmental hazards.

EMC 631: ***Environmental Law - 2 unit***
Legal mechanisms for protection of the environment: water bodies, air pollution, noise control, waste management, hazardous material and waste. Enforcement of environmental laws: the executive, statutory agencies and authorities, the judiciary and NGOs. Types of environmental liabilities: criminal liabilities, civil liabilities, compensating environmental damages, mechanism used,, who shall be compensated, who compensates; environmental litigation problems; issues of jurisdiction, *locus standi,* expert witness, pre-litigation notice, un-due delays, cost of litigation.
Sources of international environmental law; customary international law, international conventions, general principles of international law or soft laws, judicial decisions, academic commentary. Development of international environmental law: 1869-1945 (Bilateral Fisheries Conventions- creation of the UN), 1945-1972 (from creation of the UN – Stockholm conference), 1972-1992 (from Rio- present day). Principles of state co-operation, pre-cautionary principle, polluter-pay principle, no harm rule, principle of common but differentiated responsibility, sustainable development, human right to environmental health. Contemporary issues in international environmental law: ozone layer depletion, global warming, climate change, biodiversity, trans-boundary movement of waste. Relevant international institutions in environmental protection: United Nations, the International Court of Justice, the Organization for Economic Co-operation and Development, the World Bank, the World Trade Organization.

EMC 633: ***Environmental Economics - 2 unit***
Concepts, principles and the market model in environmental management; rationale for valuing environmental goods and services – the management of renewable resources and the depletion of exhaustible resources; the economic problem – economic growth versus sustainable development; market model and economic efficiency; market failure; welfare economy with specific references to environmental goods: rationale for cost benefit analysis; public decisions-making – policy requirement for cost benefit analysis and valuation.

EMC 627: ***Environmental Psychology and Policy Studies - 2 unit***
Behaviour, health and environmental stress; human behaviour and environment; children within environment; community mental health and behavioural ecology; disaster policy implementation; rural psychology; human behaviour and traffic safety; victims of the

environment; losses from natural hazards; risk analysis; advances in environment behaviour and design.
Concepts, processes and methods of planning for environmental quality. Quality of life concepts and decision making practices. Environmental policy analysis and management including an overview of systems theory and information requirement; application of research methodology to planning problems and formation of research designs. Policy application to areas such as environmental planning theory; environmental impact assessment methodology; urban and regional planning; land use analysis; growth management techniques; carrying capacity analysis; political processes in environmental planning; public sector participation; population analysis; future analysis techniques.

EMC 641: ***Principles of Environmental Management, Monitoring and Control Techniques - 2 units***
Environment/development linkages; environment network analysis; environmental management principles; environmental management steps, tools/techniques; environmental policy instruments; economic evaluation and analysis of environmental damages; cost estimation, cost/ benefits analysis; preventive measures and processes; social measure for environmental management; environmental ethics; constraints to environmental management; management of urban environment- urban land use management; management of rural environment; the role of government agencies in environmental management. Introduction to environmental management systems; components of environmental management systems; environmental management systems standards – ISO-14001, Eco-Management and Audit Scheme (EMSA); pollution abatement and control – command and control measures, market-based initiatives, end-of-pipe solution, etc.; hazardous waste techniques - hazardous waste management technologies, stabilization/solidification, biological treatment techniques, chemical treatment methods, thermal treatment of hazardous waste; EIA as an environmental management tool. Policy making; Environmental Information System; Life Cycle Assessment (LCA); Renewable resources; Corporate Social Responsibility; Supply Chain Links.

EMC 659: Environmental Impact Assessment and Sustainability Studies -2
Definition and history of environmental impact assessment; Definitions and concepts of sustainable development; the costs and benefits of undertaking EIA; understanding of the strengths and limitations of EIA; EIA as decision making process; EIA in Global Affairs; Law Policy and Institutional Arrangements/Legal Requirements for EIA; EIA Process and Components of EIA Reports; Tools for assessing environmental impact; Environmental Impact Assessment covering the biophysical, health and socio-economic environment; Public Participation, Impact evaluation, Mitigation, Monitoring, Management and Auditing process post environmental impact assessment Implementation. Practical Exercises on EIA. Overview of sustainability concepts and practices and how they are applied in real-world contexts/situations; Sustainability economics- Cost Benefit Analysis (CBA), Physical dimension of sustainability management (connection between environmental inputs i.e natural resources and outputs i.e energy and their effects on the natural environment); Public policy environment of sustainability management; General and financial management.

PGC 601: Research Methodology and Application of ICT in Research- ***3 unit***

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. Research design: sample frame, sampling techniques, surveys for quantitative and qualitative data sets in environmental management research. Multivariate statistical analysis: analysis of variance, multiple linear regression, canonical correlation, factor analysis, discriminant analysis, etc. Dissertation and thesis proposals.
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 tools 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 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.

EMC 645 : ***Geographic Information Systems*** **-** ***2 unit***
Concepts of spatial information; introduction to information processing; concepts of space and time; real world: its models and representation. Spatial information theory; geographic information system (GIS); history of GIS, GIS software architecture, data types and data structures; data storage, data entry and handling; data quality; query, maintenance and data analysis; visualization; spatial data transfer and its standard. GIS models and modeling; GIS applications in environmental management and control.

EMC 653: Global Environmental Challenges and Priority Issues
Challenges: Pollution; Global Warming; Overpopulation; Natural Resource Depletion; Waste Disposal; Climate Change; Loss of Biodiversity; Deforestation; Ocean Acidification; Ozone Layer Depletion; Acid Rain; Water Pollution; Urban Sprawl; Public Health Issues; Genetic Engineering; Nuclear issues (Nuclear fallout, Nuclear meltdown, Nuclear power, Nuclear weapons, Nuclear and radiation accidents, Nuclear safety, High-level radioactive waste management). ***Priority Issues:*** Curbing Global warming; Creating the clean energy future; Reviving the world's Oceans; Defending endangered wildlife and wild places; Protecting our health by preventing pollution; Ensuring safe & sufficient water; Fostering sustainable communities.

EMC 651: Occupational Health and Safety - 2
Introduction to Health Safety and Environment (HSE) in organisational policies; Formulation, implementation and evaluation of environmental policy initiatives within organisational environment; Risk assessment: Identification of hazards and exposures; Accident investigation and reporting; Role of Hygiene in environmental and occupational safety; Emergency

Procedures (Safety signs and evacuation plans); Fire safety; Personal Protective Equipment (PPE); the role of HSE in the work environment**.**

EMC 662: ***Projects*** **-** ***6 units***

COURSE DESCRIPTIONS FOR M.Sc IN DRM

DRM 611: ***Land use and Environmental Systems*** **-** ***2 units***
Concept of land use, Urban land use system; Rural land use system; types of land use – Resi, comm.., trans. Land use dynamics environmental systems, issues in land use compatibility and the environment, land use planning and management, land use data and information, land use policies and regulations: types and procedures, urbanization and land uses public control of land use. Case studies of land use reform – African, Asian, American Experiences etc and environmental systems planning and management, land use.

DRM **613:** ***Flood Studies.*** **-** ***2 units***
A Review of Basic Concepts: Hydrological terms associated with soil and water such as infiltration, permeability and water holding capacity. Flood as natural and man-made hazard. Historical Review of Major Flood Disasters. Climate Change and Flooding. Precipitation (Observational techniques and networks, storm rainfall analysis) Flood peak discharges, flood forecasts (prediction and frequency).

DRM 615: ***Climate Change & Disaster Risk Management*** **-** ***2 units***
Meaning of climate elements, factors, parameters; Global distribution of climatic elements; Abnormal/unexpected seasonal and annual changes in the elements; Climate change concepts and characteristics; Climate change and socio-economic and cultural development; Institutional and legal considerations in climate change controls; Case studies on climate change issues.

DRM 621: ***Disaster Risk Policy*** **-** ***2 units***
Policies and procedures governing Disaster Risk Management including but not limited to public relations relationship to other governmental agencies and in the management of natural resources including soils, water vegetation, wild life and climate. Planning for natural resource conservation and management to produce maximum benefits to society and an understanding of biological systems and the limits of nature

DRM 622: ***Strategic Emergency Response and Disaster Management*** **-** ***2 units***
Damage assessment and needs analysis, Information management, Warning dissemination, Resources management, Concept and role of emergency coordination centre,

DRM 623: ***Legal Issues in Disaster Risk Management*** **-** ***2 units***
Legal Compliance: International norms in search and rescue; prevention of criminal acts: looting, abduction, human trafficking and sexual offences. *Legal Consistency*: provision of basic needs: medicine, food, water and shelter; Equitable distribution of relief materials; Controlling mass movement. *Legal Completeness:* Clearing and evacuation of debris; Rehabilitation projects: rebuilding and repair and resuscitation of damaged infrastructure.

DRM 624: ***Community Participation in Disaster Risk Management - 2 units***
Disaster Terminologies; Introduction to CBDRM Approach (CPA); CBDRM process; Linking disaster with development: Understanding communities; Introduction to Community Participatory Approaches (CPA); Communicating with communities; Cross cutting issues in participatory Disaster Risk Management; Introduction to CPA tools & techniques; Stakeholder analysis & community relations web; Introduction to Community Based Risk Assessment (CBRA); Hazard Assessment and CVA matrix; Risk assessment and CBRA report; Preparation of CBRA report; Introduction to a community based risk management planning and participatory techniques; Shared community visioning; Obstacles/Risk Analysis; Developing Strategies; Action Planning; Activities Analysis; Actor/Stakeholder Analysis; Resource Analysis; Drafting a Community Action Plan; Practicing the tools; Community organization for CBDRM;

DRM 625: ***Disaster Trauma Management - 2 units***
Basic counseling skills, self-awareness, understanding trauma, coping mechanisms, reconciliation, group debriefing, meditation and reflection.

DRM 627: ***Public Health and Disaster Risk Management - 2 units***
Introduction: disaster as Public Health Problem; Global - Nigeria - NEMA, etc. Epidemiology of disasters: Types, Locations, Causes, Mitigating factors. National disaster Management system in Nigeria Public Health Response to Disaster Management Cycle, Emergency occurrence, Relief, Rehabilitation, Reconstruction, Mitigation; Application of Modern technology in disaster Management

DRM 629: ***Occupational Hazards and Safety Management - 2 units***
Introduction to occupational Health and safety; International Standard classification of Occupation [ISCO -88]; National Implementing Legislations, Common workplace hazard groups and principles of controlling occupational hazards in workplace. Occupational Risk assessment; Future development and challenges.

DRM 631: ***Geographic Information Systems (GIS) and Remote Sensing (RS) in DRM - 2 units***
Hazard, Vulnerability and Risk Assessment with GIS and RS; Spatial data requirements in disaster management; basic GIS and RA concepts in the context of disaster management; Hazard, Vulnerability and risk assessments with geo-data; GPS for hazard and vulnerability field data collection; Application of Risk Information and Spatial Data Infrastructure; Database generation and risk mapping; GIS project design and setup, spatial reference systems & data integration; Spatial data availability, and identification of spatial base data; Early Warning Systems and Disaster Monitoring; Early warning systems for major hazards; Use of GIS in disaster preparedness planning; Remote sensing and image processing techniques for change detection; Hazard event monitoring using remote sensing techniques; Damage Assessment and Data Dissemination; Damage assessment for recovery planning; Generation of damage databases

DRM 632: ***EIA in Disaster Risk Management*** **-** ***2 units***
Concept and meaning of EIA; Standards for EIA; EIA tools for Disaster Risk Management; Content of EIA for Disaster Risk Management; Processes and procedures for EIA in DRM. Mitigation measures; Implementation, reporting; selecting case studies.

DRM 633: ***International Collaboration in Disaster Risk Management*** **-** ***2 units***
Global viewpoints and interests in Disaster Risk Management; International treaties and agreements, conventions. Basic and forms of collaboration – Grants, partnership, Assistance Models, Relief Organizations, Governmental Institutions. Local, National. Private sector participation – NGOs, communities; Strategies for funding, policy design and decision making.

DRM 641: ***Research Methodology in DRM*** **-** ***2 units***
Design of research undertaking in disaster risk management. Sample frame sampling techniques, surveys for quantitative and qualitative data. Bivariate statistical analysis: student 't' test, correlation and simple regression. Multivariate statistical analysis of variance, multiple linear regression, canonical correlation, factor analysis, discriminant analysis etc, dissertation proposals.

DRM 642: ***Disaster Risk Valuation*** **-** ***2 units***
Classification of disaster and their implications on real property, forms of risk associated with real property and their valuation methodologies. Models for disaster and risk valuation contingent, hydronic and hybrid approaches, valuation for injurious affection, severance disturbance, the rule in Ryland vs Fletcher, disaster risk valuation analytic indices, compensation for disasters relevant provisions of Land Use Act of 1978,the role of insurance in disaster risk management and evaluation.

DRM 661: R*esearch Seminar in Disaster Risk Management* **-** ***2 units***
Review of related literature in disaster risk management. Selection of feasible research topic. Seminar presentation and reactions. The seminar should clearly show the goals, objectives and detailed procedure for carrying out research which must be original.

Ph. D COURSE DESCRIPTIONS

EMC 711: ***Advanced Environmental Impact Assessment*** **-** ***2 units***
Basic elements, contents and dimensions of EIA; framework, processes, techniques and procedures for assessment of the impact of physical and socio-economic development projects; justification for environmental impact assessment measures. The need for policies on environmental protection. Environmental Impact Evaluation (EIE), Strategic Environmental Assessment (SEA), Legislations on EIA. Environmental protection and impact assessment policies in the developing and developed countries. Local and international standards on EIA. Environmental impact indicators; case studies in oil sector, industries and transport; impact statement and report writing. Communicating environmental impact report.

EMC 721: ***Advanced Environmental Quality Management Systems - 2 units***
Nigerian environmental laws; Nigerian Environmental Protection Agency (EPA) and Standards Organization of Nigeria (SON) approved analytical methods; quality assurance programme; quality assurance manual; overview of ISO17025 management systems; auditing analytical services laboratory; introduction to ISO 14001; elements of ISO 14001; implementing ISO 14001; ISO 14001 auditing research laboratories; introduction to ISO 9001/2000; elements of ISO 9001/2; implementing and integrating ISO 9001/2 and ISO 14001.

EMC 741: ***Advanced Research Methods - 2 units***
Note: This course is an advanced form of EMC 643 – Research Methodology in Environmental Management (or its equivalent) and which is a pre-requisite for
EMC 741. Statistical models in environmental research; environmental systems indicators; advanced analytical tools; discriminant analysis; canonical correlations; advanced logit models; data analysis and presentations; experimental test research; simulation models.

EMC 761: Environmental Politics and Policy- 2 units

Environmental policy process , important policy concepts (e.g., risk, regulation, sustainability, environmental justice), Nature and scope of environmental, energy, and natural resource problems; contrasting perspectives on their severity and policy implications; the goals and strategies of the environmental community and its opponents; public opinion on the environment; scientific, economic, political, and institutional forces that shape policymaking and implementation; approaches to environmental policy analysis; and selected issues in environmental policy both within the Nigeria and globally, fate and future of Climate Change treaties, Rethinking environmental institutions; and Commodity chains and Environmental changes.

EMC 781: Special Topics in Disaster Risk Reduction and Management- 3 Units

Sendai Framework for Disaster Risk Reduction (SFDRR); Hyogo Framework for Action (HFA); the role of International Strategy for Disaster Reduction; Disaster Risk Reduction, Mitigation and Adaptation Strategies for Flooding; Erosion; Deforestation and other natural disasters; Management of relief efforts; Disaster Insurance; Climate Change and Disaster Risk; Inter-governmental Panel on Climate Change (IPCC); UN Framework Convention on Climate Change.

EMC 791: Global Environmental Challenges - 2 Units
Analysis of global environmental issues using case studies in Pollution; Global Warming; Overpopulation; Natural Resource Depletion; Waste Disposal; Climate Change; Loss of Biodiversity; Deforestation; Ocean Acidification; Ozone Layer Depletion; Acid Rain; Water Pollution; Urban Sprawl; Public Health Issues; Genetic Engineering; Nuclear issues (Nuclear fallout, Nuclear meltdown, Nuclear power, Nuclear weapons, Nuclear and radiation accidents, Nuclear safety, High-level radioactive waste management).

EMC 794: ENVIRONMENTAL MODELING - 2 Units

Statistics; Environmental Project management; Model building; Computer modeling – simulation, Data collection and Design processes; Multi-criteria model; Data Analysis and Interpretation; Research Colloquia.

PGC 701: SYNOPSIS AND GRANT WRITING - 3 Units

Identification of types and nature of 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.

EMC 762: Thesis - 12 units