**BAYERO UNIVERSITY KANO**

**EARTH AND ENVIRONMENTAL SCIENCES**

**ENVIRONMENTAL MANAGEMENT**

**BSC ENVIRONMENTAL MANAGEMENT**

**30% ADDITION TO THE CCMAS COURSE STRUCTURE/SUMMARY**

**100 LEVEL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-BIO 101 | General Biology I | 2 | C\* | 30 | - |
| BUK-BIO 102 | General Biology II | 2 | C\* | 30 | - |
| BUK-PHY 101 | General Physics I | 2 | C\* | 30 | - |
| BUK-PHY 102 | General Physics II | 2 | C\* | 30 | - |
| BUK-EVM 105 | Map Analysis | 2 | C | 15 | 30 |
| BUK-EVM 106 | Elements of Land Surveying | 2 | C | 15 | 30 |
| BUK-EVM 107 | Field Studies | 2 | C | 15 | 30 |
|  | **Total** | **10** |  |  |  |

* **C\* = Students are to offer either of BIO or PHY**

**200 LEVEL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-EVM 205 | Spatial Data Analysis | 3 | C | 45 | - |
| BUK-EVM 207 | Introduction to Remote Sensing and Geographic Information System | 3 | C | 45 | - |
| BUK-EVM 209 | The Kano Environment | 3 | C | 30 | 45 |
|  | **Total** | **9** |  |  |  |
| **ELECTIVES** |  |  |  |  |  |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-GEO 203 | Spatial Organization of Society | 2 | E | 30 | - |
| BUK-URP 204 | Introduction to Land use Planning | 2 | E | 30 | - |
|  | **Total** | **4** |  |  |  |

**300 LEVEL**

| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| --- | --- | --- | --- | --- | --- |
| BUK-EVM 301 | Sustainable Futures | 3 | C | 30 | - |
| BUK-EVM 303 | Introduction to Management Skills | 3 | C | 30 | - |
| BUK-EVM 304 | Principles of Remote Sensing | 3 | C | 30 | 90 |
|  | **Total** | **9** |  |  |  |

**400 LEVEL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-EVM 403 | Global Environmental Change | 2 | C | 30 | - |
| BUK-EVM 407 | Environmental Health and Safety | 3 | C | 45 | 15 |
| BUK-EMT 410 | Spatial Studies of Communicable Diseases | 2 | C | 30 |  |
|  | **Total** | **7** |  |  |  |

**500-LEVEL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-EVM 503 | Systems thinking and Environmental Management | 2 | C | 30 | - |
| BUK-EVM 504 | Advanced Remote Sensing | 2 | C | 15 | 90 |
| BUK-EVM 505 | Resource Recovery and Circular Economy | 2 | C | 30 | - |
| BUK-EVM 506 | Environmental Planning and Protection | 2 | C | 45 | - |
| BUK-EVM 509 | Climate Change and Carbon Financing | 2 | C | 30 | - |
|  | **Total** | **10** |  |  |  |
|  | **GRAND TOTAL** | **49** |  |  |  |

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**BIO 101 General Biology I (2 Units; Core; L = 30)**

**Senate-approved relevance**

This course is to introduce students to basic biological sciences that would be a basis for understanding the environment. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

An introductory course designed to familiarize students with the nature and goals of science, contemporary biological theories of life, and the understanding and significance of interactions between themselves, other living things on the planet, and the environment.

The courses take an interdisciplinary approach that emphasizes the scientific method and considers how important science is to society. The fundamental ideas discussed include systems biology, the scientific method, evolution, structure and function, information flow, genetic information storage and exchange, and routes and transformations of energy and matter.

**Objectives**

The objectives of the course are to:

1. Explain cells structures and organisations.
2. Summarize functions of cellular organelles.
3. Characterize living organisms and state their general reproduction.
4. Describe the interrelationship that exists between organisms.
5. Discuss the concept of heredity and evolution.

**Learning outcomes**

On completion of the course, students should be able to:

1. Identify different cell structures and organisation.
2. Describe the functions of cellular organelles.
3. Examine living organisms and state their general reproduction.
4. Explain the interrelationship that exists between organisms.
5. Understand the concept of heredity and evolution.

**Course contents**

This course will explain cell structure and organisation, functions of cellular organelles. Characteristics and classification of living things. Chromosomes, genes; their relationships and importance. General reproduction. interrelationships of organisms (competitions, parasitism, predation, symbiosis, commensalisms, mutualism, saprophytism). Furthermore, heredity and evolution (introduction to Darwinism and Lamarkism, Mendelian laws, explanation of key genetic terms), Elements of ecology and types of habitats will be discussed.

**Minimum Academic Standards**

Field and Laboratory is required with a NUC-MAS requirement facilities.

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**BIO 102 General Biology II (2 Units; Core; L = 30)**

**Senate-approved relevance**

This course is to introduce students to basic biological sciences that would be a basis for understanding the environment. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The course discusses biological processes at various spatial and temporal scales that will serve as a foundation for understanding contemporary biological issues, the significance of these issues for current societal issues, and its relationship with the environmental sciences.

The course covers ecology fundamentals, biological variety, plant structure and function, animal systems, development, and reproduction. It focuses on the inter relationship between organisms ecological adaptation of organisms, elements of ecology and types of habitats, Heredity and Evolution.

**Objectives**

The objectives of the course are to:

1. List the characteristics, methods of identification and classification of viruses, bacteria and fungi.
2. State the unique characteristics of plant and animal kingdoms.
3. Describe ecological adaptations in the plant and animal kingdoms.
4. Discuss nutrition, respiration, excretion and reproduction in plants and animals.
5. Describe growth and development in plants and animals.

**Learning Outcomes**

At the end of the lectures, students should be able to:

1. Understand the characteristics, methods of identification and classification of viruses, bacteria and fungi.
2. Describe the characteristics of plant and animal kingdom.
3. Explain ecological adaptations in the plant and animal kingdoms.
4. Explain nutrition, respiration, excretion and reproduction in plants and animals.
5. Understand the processes of growth and development in plants and animals.

**Course Contents**

Basic characteristics, identification and classification of viruses, bacteria and fungi. A generalized survey of the plant and animal kingdoms based mainly on the study of similarities and differences in the external features. Ecological adaptations. Briefs on physiology to include nutrition, respiration, circulatory systems, excretion, reproduction, growth and development.

**Minimum Academic Standards**

Field and Laboratory work is required with a NUC-MAS requirement facilities.

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**ECO 113** **Theories and principles of economics (2 Units; Core; L = 30)**

**Senate-approved relevance**

This course is to enable students develop critical thinking abilities with the knowledge required for an effective discussion of economic issues and factors of production. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Introduces the essential ideas that are crucial for comprehending how people and organizations operate within an economy. A wide range of theoretical and practical themes are covered, including how changing market conditions affect consumers and businesses, how government policies affect the economy and business decisions, and how both microeconomic and macroeconomic principles are covered.

Since economics is defined based on the two assumptions, they serve as the foundation for discussing how they relate to other interconnected ideas. The interdependence and intricacy of economics are thus made clear through the use of real-world.

**Objectives**

The objectives of the course are:

1. Define economics and identify the basic economic principles governing the market economy.
2. State the historical evolution of economic ideas.
3. Differentiate between micro and macro-economic principles.
4. Discuss the various areas of specialisation in economics.
5. Relevance of economic theory to development.

**Learning Outcomes**

At the end of the course, students shall demonstrate the following competencies:

1. Understand the concept of economics and identify the basic economic principles governing the market economy.
2. Explain the historical evolution of economic ideas.
3. Understand the difference between micro and macro-economic principles.
4. Identify the various areas of specialisation in economics.
5. Explain the relevance of economic theory to development and its relationship with the environment.

**Course Contents**

As an introduction to the various issues, the nature of economics and science. Its scope and methodology. Major areas of specialization. Historical development of economic ideas. Major findings in the various areas of specialization. Elementary principles of Micro-economic theories. Current issues of interest and probable future development. Concept of Equilibrium and Elasticity. Theory of Consumer Behaviour. Theory of Production and Costs. Market structure. Elementary principles of Micro-economic theories. Introduction to macroeconomics. Current issues of interest and probable future development.

**Minimum Academic Standards**

Field practical is required with a NUC-MAS requirement facilities.

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**BUK-EVM 105** **Map Analysis** (**3 Units; Core; L = 15; P = 45)**

**Senate-approved relevance**

This course gives students a strong foundation in the fundamental ideas and methods of mapping and spatial analysis and equips them with the skills necessary to effectively employ GIS and remote sensing technology. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Map analysis is the process of looking at maps and geographical information without using computer software. The goal of map analysis is to help students to understand the basic ideas and methods of mapping and spatial analysis.

It can also be used as an extra tool in environmental management to help make decisions and figure out how to run things. For example, looking at aerial photos or satellite images by hand can tell you important things about how land is used, how plants grow, and other environmental factors. This information can be used for environmental monitoring and resource management. This course will help students understand the basic ideas and techniques of mapping and spatial analysis that can be used as a supplement to help make decisions and inform management strategies.

**Objectives**

The objectives of the course are to:

1. Explain the basic ideas and methods of mapping and spatial analysis.
2. Discuss the spatial analysis skills, such as how to measure distances and areas and find patterns and trends in data about the environment.
3. Discuss the role manual map analysis in environmental management and how it can be used to help make decisions and shape management strategies.
4. Interpret and analyze data for critical decision-making process.
5. Analyse real-world environmental problems like tracking the spread of invasive species and managing water resources.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the fundamental methods of manual map analysis.
2. To make topographic maps.
3. Understand how thematic maps work, including map types, map scales, and map legends.
4. Understand environmental themes shown on the maps, such as vegetation, soil types, and hydrology.
5. Use their knowledge and abilities to solve real-world environmental issues, like mapping out land usage and land cover, keeping an eye on the environment, and managing natural resources.

**Course contents**

Introduction to Map Analysis: In this lesson, you will learn the fundamental ideas and methods of manual map analysis, such as scales, coordinate systems, and projections. Environmental Mapping: This module discusses the fundamentals and methods of mapping for environmental management, including mapping of land use and land cover, managing natural resources, and monitoring the environment. Topographic Maps: With an emphasis on comprehension of the topographic features that are pertinent to environmental management, this module addresses the basics of topographic maps, including contours, spot heights, and relief depiction. The fundamentals of thematic maps, including map types, map sizes, and map legends, are covered in this module. An emphasis is placed on comprehending the environmental themes portrayed on the maps, such as vegetation, soil types, hydrology, etc.

**Minimum Academic Standards**

Cartography Laboratory is required with a NUC-MAS requirement facilities.

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**BUK-EVM 106 Elements of Land Surveying (3 Units; Core; L = 15; P = 45)**

**Senate-approved relevance**

This course trains students in understanding the concepts, procedures, and methods involved in land surveying as it relates to management and conservation of natural resources, land surveying is a significant component of environmental management. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Since it offers essential information for the efficient management and conservation of natural resources, land surveying is a significant component of environmental management. The history and evolution of land surveying, surveying tools and equipment, surveying principles and techniques, geodetic surveying, and cadastral surveying, aerial and satellite surveying, field work, and data analysis are all common topics covered in land surveying course curriculums.

The objective of the course is to give students a thorough comprehension of the material as well as the knowledge and abilities needed to employ surveying technology in environmental management. This involves having the skills necessary to gather and analyze data, interpret findings, and come to well-informed conclusions. The study of land surveying is essential for preparing students for professions in the sector as well as for the efficient management and conservation of natural resources.

**Objectives**

The objectives of the course are to:

1. Discuss the development and history of land surveying, as well as its function in environmental management.
2. Expose students to the various instruments and tools used in contemporary land surveying.
3. Discuss the concepts, procedures, and methods of land surveying.
4. Explain geodetic surveying, cadastral surveying, aerial and satellite surveying, and their function in environmental management.
5. Gather and evaluate data, understand conclusions, and make defensible judgments in managing the environment.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the growth, development and history of land surveying, as well as its function in environmental management.
2. Understand and use surveying tools and technologies in contemporary land surveying.
3. Understand the concepts, procedures, and methods of land surveying.
4. Apply geodetic surveying, cadastral surveying, aerial surveying, and satellite surveying in environmental management.
5. To collect data and evaluate facts, understand results, and base judgments on their conclusions.

**Course contents**

This course introduces the students to Land Survey. It covers the basic concepts and principles of land surveying, including survey history, survey equipment, and survey measurements. Field Surveying will cover aspects of fieldwork and surveying techniques used including traversing, leveling, and topographical surveys, as well as the use of GPS and other surveying instruments. Surveying for Environmental Management will cover the principles and techniques of surveying for environmental management. This focuses on land use and land cover mapping, natural resource management and environmental monitoring. Topographic Surveying will cover the principles of topographic surveying which include contours, spot heights, and relief representation, with emphasis on understanding the topographic features that are relevant to environmental management. The Legal Aspects of Surveying will also be discussed and this will cover surveying laws, regulations and boundaries. Field work will form part of this course to give the students the opportunity to apply the concepts and techniques learned throughout the course by completing a land surveying project that is specific to environmental management.

**Minimum Academic Standards**

Land and environmental survey equipments with NUC-MAS requirement facilities.

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**BUK-EVM 107 Field Studies (3 Units; Core; L = 15; P = 30)**

**Senate-approved relevance**

This course introduces the students to their local environment, to equip them with the necessary skills required for field observations and data collection relevant to environmental issues. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

This course will cover field visits to strategy locations of relevance around the local environment to introduce the students to the natural and built environment- focusing on developments and their consequent problems on the environment.

This course will introduce students to gaining practical skills and knowledge required for environmental managers.

**Objectives**

The objectives of the course are to:

1. Introduce students to their local environment (Built and Natural Environment).
2. Examine the problems peculiar to the environment.
3. Discuss the interdisciplinary nature of environmental management.
4. Discuss developments and their consequent problems on the environment.
5. Introduce tools appropriate for tackling environmental problems and proffer solutions.

**Learning outcomes**

On completion of the course, students should be able to:

1. Familiar with their local environment.
2. Understand the nature of problems that are peculiar to their local environment.
3. Understand the interdisciplinary nature of environmental management.
4. Proffer local solutions to environmental problems.
5. Use tools appropriate for monitoring environmental problems.

**Course contents**

This course provides students with opportunities for field investigations in local settings in which key measurements and other data will be collected relevant to environmental issues. Students will be introduced to and trained in the use of appropriate field and practical experiences of data collection to complement theoretical elements.

**Minimum Academic Standards**

Field work forms the whole of this course

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**BUK-EVM 205** **Spatial Data Analysis (3 Units; Core; L = 30; P = 45)**

**Senate-approved relevance**

Students who enrol in a bachelor's program in environmental management will learn how to gather, handle, and evaluate environmental data, especially geospatial data, to aid in environmental decision-making. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Spatial data analysis is the process of analyzing and interpreting environmental data using geographic information and methods. Students who enroll in a bachelor's program in environmental management learn how to gather, handle, and evaluate environmental data, especially geospatial data, to aid in environmental decision-making. In this course, you'll learn about geographic information systems (GIS), remote sensing, managing and analyzing geographical data, spatial statistics, and spatial modeling. When making judgments about environmental management, students learn how to gather, prepare, and analyze geographical data.

The goal of this course is to give students the knowledge and abilities necessary to use spatial data analysis in environmental management effectively, including the capacity to gather and process geospatial data, conduct spatial analyses, and make defensible decisions in light of the findings. In conclusion, spatial data analysis is a crucial part of environmental management because it offers the tools and methods needed to examine and comprehend the connections between environmental factors and human behavior.

**Objectives**

The objectives of the course are to:

1. Discuss the fundamentals and techniques of geographical data analysis, including geographic information systems (GIS), remote sensing, spatial data management and analysis, spatial statistics, and spatial modeling.
2. Evaluate environmental data including geospatial data in order to support environmental decision-making.
3. Explain the connections between environmental management and human activity as well as the significance of spatial data analysis.
4. Examine and visualize spatial data for environmental management decisions.
5. Explain and execute the techniques of geographic data analysis using software and technology, including GIS, remote sensing, and other pertinent tools.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the principles and techniques involved in spatial data analysis, such as spatial data management and analysis, spatial statistics, and spatial modeling.
2. Acquire environmental decision-making knowledge and abilities to gather and analyse environmental data, particularly geospatial data.
3. Process, analyze, and visualize spatial data and apply the findings to influence management decisions for the environment.
4. Understand the connections between environmental change and human activity, as well as the use of spatial data analysis in environmental management.
5. Understand the importance of spatial data analysis for professions in environmental management and related sectors.

**Course contents**

This course introduces the application to statistical concepts such as probability, distribution, and statistical inference. It further explores the application of data analysis, including methods for visualizing and summarizing data. Regression analysis application, including simple linear regression, multiple regression, and model selection. Analysis of variance and experimental design application. Time series analysis and forecasting. Spatial data analysis, including spatial statistics and geographic information systems (GIS). Application of statistical and spatial methods to real-world problems, such as environmental monitoring, public health, and urban planning. Software tools for data analysis, such as R, SAS, SPSS, or Python should be introduced. Special topics such as machine learning, multivariate analysis, or spatial econometrics may also be included.

**Minimum Academic Standards**

The course will require practical sessions to assist students in applying the principles they have learnt to actual datasets with NUC-MAS requirement facilities.

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**BUK-EVM 206** **Introduction to Remote Sensing and Geographic Information System (2 Units; Core; L = 45)**

**Senate-approved relevance**

The course is to give students the knowledge and abilities necessary to use spatial data analysis in environmental management. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Spatial data analysis is the process of analyzing and interpreting environmental data using geographic information and methods. Students who enroll in a bachelor's program in environmental management learn how to gather, handle, and evaluate environmental data, especially geospatial data, to aid in environmental decision-making. In this course, you'll learn about geographic information systems (GIS), remote sensing, managing and analyzing geographical data, spatial statistics, and spatial modeling. When making judgments about environmental management, students learn how to gather, prepare, and analyze geographical data.

The course's overarching goal is to give students the knowledge and abilities necessary to use spatial data analysis in environmental management effectively, including the capacity to gather and process geospatial data, conduct spatial analyses, and make defensible decisions in light of the findings. In conclusion, spatial data analysis is a crucial part of environmental management because it offers the tools and methods needed to examine and comprehend the connections between environmental factors and human behavior.

**Objectives**

The objectives of the course are to:

1. Discuss the fundamentals and techniques of geographical data analysis using geographic information systems (GIS), remote sensing, spatial data management and analysis, spatial statistics, and spatial modeling.
2. Explain the fundamentals of environmental data gathering and handling including geospatial data.
3. Examine the connections between environmental management and human activity as well as the significance of spatial data analysis.
4. Examine the process of geographic data analysis.
5. Explain the use of software and technology, including GIS, remote sensing, and other pertinent tools.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand electromagnetic radiation and sensor technologies as well as remote sensing techniques.
2. Understand remote sensing data types, including lidar, satellite images, and aerial photography.
3. Use remote sensing methods to solve problems and make decisions in environmental management.
4. Have a mastery of GIS-based mapping and spatial analysis, including map production and interpretation, visualization, and analysis.
5. Use GIS approaches and tools for environmental management decision-making and challenges.

**Course contents**

Introduction to remote sensing, including the history, principles, electromagnetic spectrum and applications of remote sensing technology. Fundamentals of image interpretation, including image enhancement techniques, image classification, and image analysis. Satellite remote sensing platforms and sensors, including multispectral sensors. Aerial remote sensing, including photogrammetry, LiDAR and UAVs. Introduction to GIS, including the history, principles, and applications of GIS technology. Fundamentals of GIS data, including data types, data structure, data quality and data management. GIS software, including ArcGIS, QGIS and open-source alternatives. Spatial data analysis, including spatial statistics, spatial modeling, and spatial decision-making Applications of GIS and remote sensing in various fields, such as environmental monitoring, natural resources management, urban planning, and disaster management Hands-on exercises, lab sessions, and project work to provide students with practical experience using GIS and remote sensing software and techniques.

**Minimum Academic Standards**

GIS and Remote sensing laboratory needed with NUC-MAS requirement facilities.

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**GEO 203: Spatial Organisation of Society (2 Units C: LH 30)**

**Senate-approved relevance**

The course is to give students an understanding of the concepts and conceptual framework of Spatial Organisation and Society focusing on Man – Environment relationships. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The course discusses the fundamental ideas of spatial organization: the classification rule geographic phenomena, population expansion and spatial distribution, and the spatial distribution of natural resources.

It also explains Natural resource characteristics and the state of resource utilisation; Production system, typology and distribution, notation spacing and population increase, nature of space travel and utilization of the land, and topography pattern and distribution.

**Objectives**

The objectives of the course are:

1. Define basic concepts of spatial organization.
2. Classify different phenomena (population, production, and geographic features) that are spatially dispersed.
3. Interpret land use and patterns and interactions.
4. Discuss the characteristics of Natural resources and their spatial distribution.
5. Discuss the nature of space travel and utilization of land.

**Learning Outcomes**

Human societies and geographic features are not evenly distributed or organized. This course helps the students to find order out of the chaos. At the end of the course the students should be able to:

1. Understand the basic concepts of spatial organization.
2. Identify spatial features and phenomena (population, production, and geographic features).
3. Understand land use and patterns and interactions.
4. Explain the characteristics of Natural resources and their spatial distribution.
5. Identify and explain the nature of space travel and utilization of land.

**Course Contents**

Basic concepts of spatial organization: principles of classification of geographical phenomena; growth and spatial distribution of population. Production systems; typology and distribution; location, spacing and growth of settlements; movements over space and transport networks. Land-use; typology, patterns and interaction.

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**BUK-EVM 209 The Kano Environment (2 Units C: LH 30)**

**Senate-approved relevance**

Knowledge of the local environment gives the students first hand experience in the nature of problems expected at the local scale and an insight on problems at the global scale as well. This will equip them towards contributing to problem solving at the local level thereby minimizing global impacts of environmental change. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The course discusses and analyses the different perspectives of the physical and human aspects of the Kano environment with basic understanding of a typical environment in Sub-Saharan Africa.

The physical aspect - vegetation, hydrology, soils and landforms and the human aspect such as the land use, population distribution and growth, and settlement patterns in the rural and urban areas.

**Objectives**

The objectives of the course are to:

1. Discuss the physical and human aspects of Kano Environment.
2. Examine the land use land cover types.
3. Discuss the associated impacts of these land use land cover types.
4. Examine the rural-urban environmental quality.
5. Discuss the nature of rural-urban relations.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the physical and human aspects of Kano.
2. Identify the various land use land cover types that are peculiar to Kano environment.
3. Identify the problems associated with the different land use land cover types.
4. Examine the impact of land use types on the quality of the environment.
5. Understand the nature of rural-urban relations.

**Course contents**

An introduction to the physical and human aspects of the Kano environment; the physical environment will look at Weather and Climate, vegetation, hydrology, soils and landforms. The human aspect comprises the social and economic aspects such as the land use, population distribution and growth, and settlement patterns in the rural and urban areas; the historical evolution of the Kano and the nature of rural-urban relations; transportation, Industrialization, urban expansion and agriculture. The physical aspect - vegetation, hydrology, soils and landforms and the human aspect such as the land use, population distribution and growth, and settlement patterns in the rural and urban areas.

**Minimum Academic Standards**

Field work will form part of this course based on NUC-MAS requirement facilities.

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**BUK-EVM 301 Sustainable Futures (2 Units C: LH 30)**

**Senate-approved relevance**

This course will discuss all of the SDGs as it applies to sustainable development as a whole. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

In recent years catastrophic and extreme weather events, from hurricanes to major flooding, earthquakes and landslides have great potential risks to sustainable development. Issues such as flooding, water supply, heat waves, poor air quality and food security are driving innovations in the design of buildings and landscapes, transport, and food systems and manufacturing processes.

These are exacerbated by climate change processes and environmental degradation and require new approaches in all of the environmental professions at both local and global scales. This course equips students with sustainable options for problem solving.

**Objectives**

The objectives of the course are to:

1. To explore the relationship between man and the natural environment.
2. To explore sustainability challenges faced by society today.
3. To develop skills in applying sustainability principles.
4. To understand the different sectors and professionals (including planners, environmental managers, real estate & development professionals, designers, community planners and communities) geared sustainable futures.
5. Examine the Sustainable Development Goals and their implications for the future.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the relationship between man and the natural environment.
2. Discuss the impacts of man’s activities on his environment.
3. Understand the concept of sustainability.
4. Understand the sustainability challenges faced by society today.
5. Demonstrate an understanding of key policies for different sectors and the connection to future sustainability.

**Course contents**

This course aims at exposing students to environmental issues such as flooding, water supply, heat waves, poor air quality and food security and how innovations in the design of buildings and landscapes, transport, and food systems and manufacturing processes can sustain the future.The ma nagement of processes of rapid urban growth and change in cities of developed and developing countries will be discussed as populations will continue to increase in urban areas in the coming years. Introduction to formal and informal elements of urban management systems and exploration of alternative approaches to dealing with problems arising from rapid urban growth.

**Minimum Academic Standards**

Field work will form part of this course based on NUC-MAS requirement facilities.

BAYERO UNIVERSITY KANO

EARTH AND ENVIRONMENTAL SCIENCES

ENVIRONMENTAL MANAGEMENT

BSC ENVIRONMENTAL MANAGEMENT

**EVM 303 Environment and Business** **(2 Units; LH= 30)**

**Senate-approved relevance**

This course attempts to sensitize students to current affairs and the recent developments in the world economy. The course aims to expose the students to the problems and issues relating to economic policy and their implications business and the environment. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The course enables students to develop the requisite skills needed for a managerial career in any sector both at the national and international levels. Students will have a broad knowledge in various aspects of business and management, enabling them to become versatile and well-rounded professionals with excellent management skills and awareness.

Specifically, the course introduces students to the ways organizations function and are managed. This includes amongst others, the role of the manager, leadership, motivation, organisational behaviour, change management, financial management and strategy, and communication skills.

**Objectives**

The objectives of the course are to:

1. Discuss the requisite skills needed for a managerial career in any sector both at the national and international levels.
2. Explain the various aspects of business and management, enabling them to become versatile and well-rounded professionals with excellent management skills and awareness.
3. Discuss the ways organizations function and are managed.
4. Discuss the role of the manager, leadership, motivation and organisational behaviour
5. Explain change management, financial management and strategy, and communication skills.

**Learning outcomes**

On completion of the course, students should be able to:

1. Develop the requisite skills needed for a managerial career in any sector both at the national and international levels.
2. Understand the various aspects of business and management.
3. Acquire the skills to become versatile and well-rounded professionals with excellent management skills and awareness.
4. Understand the ways organizations function and are managed including the role of the manager, leadership, motivation and organisational behaviour.
5. Explain change management, financial management and strategy and communication.

**Course contents**

The course enables students to develop the requisite skills needed for a managerial career in any sector both at the national and international levels. Students will have a broad knowledge in various aspects of business and management, enabling them to become versatile and well-rounded professionals with excellent management skills and awareness. Specifically, the course introduces students to the ways organizations function and are managed. This includes amongst others, the role of the manager, leadership, motivation, organisational behaviour, change management, financial management and strategy, and communication skills.

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EARTH AND ENVIRONMENTAL SCIENCES

ENVIRONMENTAL MANAGEMENT

BSC ENVIRONMENTAL MANAGEMENT

**BUK-EVM 312 Principles of Remote Sensing (3 Units; Core; L = 30; PH = 45)**

**Senate-approved relevance**

The course focuses on the principles of remote sensing and its usage in environmental management including mapping of land use and land cover, managing natural resources, handling emergencies, and analyzing climate change. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

An overview of the principles of remote sensing and its uses in environmental management is given in the Principles of Remote Sensing course. The course covers the fundamentals of remote sensing, including electromagnetic radiation principles, sensor technologies, image processing, and the various types of remote sensing data, including lidar, satellite images, and aerial photography.

Additionally, it examines how remote sensing is used in environmental management, including mapping land use and land cover, managing natural resources, managing disasters, and analyzing climate change. The course's goal is to give students a thorough understanding of remote sensing's concepts and applications in environmental management, as well as to lay the groundwork for applying remote sensing in environmental decision-making.

**Objectives**

The objectives of the course are to:

1. Discuss electromagnetic radiation's basic concepts and its applications to remote sensing.
2. Examine the various remote sensing data and sensor types, such as lidar, satellite images, and aerial photography.
3. Investigate how remote sensing is used in environmental management, including mapping land usage and land cover, managing natural resources, managing disasters, and analyzing climate change.
4. Explain the process of analyzing data from remote sensing in order to aid in environmental decision-making.
5. Examine the relationship between remote sensing and other environmental management tools and methodologies, such as spatial analysis and the Geographic Information System (GIS).

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand remote sensing physics and electromagnetic radiation principles.
2. Recognize and evaluate many types of remote sensing data, such as satellite images, and aerial photography.
3. Analyze and comprehend images and data from remote sensing.
4. Understanding how remote sensing is used in environmental management, including mapping land usage and land cover, managing natural resources, managing disasters, and analyzing climate change.
5. Acquire analytical and problem-solving abilities using remote sensing for environmental management.

**Course contents**

Introduction to Remote Sensing: The electromagnetic spectrum, various types of sensors, and data acquisition are all covered in this component's introduction to remote sensing's fundamental principles. Image Interpretation: The methods for interpreting data from remote sensing, such as image enhancement, image classification, and change detection, are covered in this section. The various platforms used to acquire data from remote sources, such as aircraft, satellites, and unmanned aerial vehicles, are covered in this section (UAVs). Applications of Remote Sensing: This module discusses the different uses of remote sensing, such as the mapping of land use and land cover, the management of natural resources, and environmental monitoring. This module's discussion of image processing includes such processes as image rectification, image registration, and image fusion.

**Minimum Academic Standards**

GIS and Remote sensing laboratory needed with NUC-MAS requirement facilities.

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ENVIRONMENTAL MANAGEMENT

BSC ENVIRONMENTAL MANAGEMENT

**BUK-EVM 401** **Global Environmental Change** **(2 Units; Elective; L = 15; P = 45)**

**Senate-approved relevance**

Production of high-quality graduates with the necessary skills to not only think global, but with the right capacity to understand how local environmental issues, especially in Nigeria’s arid and semi-arid areas, have contributed to global environmental change; focusing on natural variations of the environment over time, the impact of human action on the Earth and its environmental systems, and the projection of future environmental changes. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

This course will cover a number of looming global environmental problems, what society can do about them, and the reasons why we aren’t doing more. We will introduce a number of psychological and socio-economic factors that contribute to environmental issues, and use them to gain insight into and draw parallels between specific environmental problems.

The importance of this course lies in addressing the need for achieving sustainable development goals (SDGs) numbers 1, 2, 11, and 13 in the areas of poverty reduction, zero hunger, sustainable communities/cities, and climate action issues, respectively.

**Objectives**

The objectives of the course are to:

1. Introduce some of the major themes in global environmental change, a relatively new interdisciplinary field.
2. Describe the major components of the Earth system, along with the ways they are linked and vary over time.
3. Examine the basic concepts of environmental change, both natural and human induced.
4. Identify and explain the tools used for projecting future environmental changes.
5. Examine the SDGs and their targets regarding changes in the environment.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the major themes in global environmental change, a relatively new interdisciplinary field.
2. Identify the major components of the Earth system, along with the ways they are linked and vary over time.
3. Discuss the basic concepts of environmental change, both natural and human induced.
4. Understand the social, psychological, economic and political issues surrounding each of the global environmental issues covered in class.
5. Project future environmental changes.

**Course contents**

Students in a bachelor's program in environmental management who take the global environmental change course learn about the worldwide environmental changes that are taking place and their effects on the natural world and human societies. The course includes subjects like global environmental change's effects on ecosystems, biodiversity, and human societies as well as atmospheric processes and greenhouse gases, the carbon cycle, and global climate change. The course also examines the numerous factors that contribute to environmental change on a global scale, such as human activities like urbanization, industrialisation, and deforestation, as well as natural occurrences like volcanic eruptions and modifications to the Earth's orbit and axial tilt. The course's goal is to give students a thorough grasp of the factors that contribute to global environmental change, as well as how it is managed, and to give them the information and abilities they need to successfully deal with these issues. The normal course structure consists of lectures, debates, group projects, as well as hands-on exercises and outings.

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**BUK-EVM 407 Environmental Health and Safety** **(3 Units; LH= 30, PH= 15)**

**Senate-approved relevance**

Production of high-quality graduates with the necessary skills to identify and understand the human health and disease that are determined by environmental factors, This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Environmental Health and Safety is a multidisciplinary programme that examines the relationship between workplace factors and human health, safety and well-being. Students study subjects including the basic sciences, health sciences, engineering, law and regulatory affairs among others.

**Objectives**

The objective of the course is to:

1. Examine the environmental factors impeding on human health.
2. Discuss the theories and practices of monitoring environmental health issues.
3. Discuss both the direct pathological effects of the physical, chemical and biological agents; and the effects (often indirect) on health and well-being of the broad physical, psychological, social and cultural environment.
4. Identify and describe the activities of those stakeholders which implement environmental health policies, the promotion and the improvement of environmental parameters.
5. Examine the ways managing environmental health issues.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand aspects of human health and diseases that are determined by environmental factors.
2. Understand the theories and practices of monitoring and assessing such factors in the environment that have the potential of managing environmental health issues.
3. Understand the direct pathological effects of the physical, chemical and biological agents; and the effects (often indirect) on health and well-being of the broad physical, psychological, social and cultural environment.
4. To know identify the stakeholders and know their activities such as implementing environmental health policies through monitoring and enforcement activities; the promotion and the improvement of environmental parameters by using environmentally friendly and healthy technologies and behaviors including the development.
5. Have the ability to suggest new policy areas or amendments.

**Course Content**

This course focuses on those aspects of human health and disease that are determined by environmental factors, discussing the theory and practice of monitoring and assessing such factors in the environment that have the potential of managing environmental health issues. The content should include both the direct pathological effects of the physical, chemical and biological agents; and the effects (often indirect) on health and well-being of the broad physical, psychological, social and cultural environment. It will also identify and describe the activities of those stakeholders which implement environmental health policies through monitoring and enforcement activities; the promotion and the improvement of environmental parameters by using environmentally friendly and healthy technologies and behaviors including the development and suggestion of new policy areas or amendments.

**Minimum Academic Standards**

Field work will form part of this course based on NUC-MAS requirement facilities.

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**BUK-EMT 410 Spatial Studies of Communicable Diseases (2 Units; Core; L = 30)**

**Senate-approved relevance**

Students will explore the principles of how disease manifests itself in society and the environment and how it spreads. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The ecological and spatial approaches to the study of communicable diseases (epidemic and pandemic etc), measures, methods and techniques of controlling diseases in general, the major patterns of diseases in the tropical and temperate areas; the possible control strategies the provision and utilization of health care services and the factors influencing these.

**Objectives**

The objectives of the course are to:

1. Examine how people and their environments interact and how that interaction affects public health.
2. Discuss disease diffusion and human ecology.
3. Discuss the use of geographic information systems (GIS) for public health, inequities in health and healthcare, and various techniques for analyzing health/disease data.
4. Assess health outcomes based on geographic variation.
5. Examine the relationship between health and economic, environmental, cultural, racial, political, and historical factors, as well as the function of place.

**Learning Outcomes**

At the end of this course, students should be able to:

1. Understand how people and their environments interact and how that interaction affects public health.
2. Understand disease diffusion and human ecology.
3. Use of geographic information systems (GIS) for public health, inequities in health and healthcare, and various techniques for analyzing health/disease data.
4. Explain health outcomes based on geographic variation.
5. Understand the relationship between health and economic, environmental, cultural, racial, political, and historical factors, as well as the function of place.

**Course Content**

This course offers a thorough introduction to spatial distribution of communicable diseases that examines how people and their environments interact and how that interaction affects public health. Disease diffusion and human ecology, the use of geographic information systems (GIS) for public health, inequities in health and healthcare, and various techniques for analyzing health/disease data are the main subjects covered. The focus on the spatial distributions of health-related events distinguishes the relationship between health-environment nexus and other disciplines of epidemiology, biostatistics, and medical anthropology. It enables assessing health outcomes based on geographic variation brought on by economic, environmental, cultural, racial, political, and historical factors, as well as the function of "place."

**Minimum Academic Standards**

Practical work forms part of this course based on NUC-MAS requirement facilities.

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**BUK-EVM 503** **Systems thinking and Environmental Management (2 Units; LH = 30)**

**Senate-approved relevance**

This course will also equip students with the necessary skills in understanding of the concepts and tools of Systems thinking and system dynamics and their application to decision-making and problem solving through knowledge of the nature, origin and classification of systems and system thinking tools. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

This course will conceptualize systems thinking and link it to environmental management. Identification of tools of Systems Thinking, System Dynamics and their application to decision-making and problem solving.

**Objectives**

The objective of the course is to:

1. Discuss the various types of systems applicable.
2. Explore the meaning and origin of systems thinking, types of systems, Traditional (reduction) science and holistic (system thinking).
3. Examine systems and their application for environmental management.
4. Examine the tools of systems thinking; system dynamics.
5. Explain the application of systems thinking for problem solving in environmental management.

**Learning outcomes**

On completion of the course, students should be able to:

1. Conceptualize and contextualize systems thinking in environmental management.
2. Understand the meaning and origin of systems thinking, types of systems, Traditional (reduction) science and holistic (system thinking).
3. Characterize systems and their application for environmental management.
4. Identify the tools of systems thinking, system dynamics.
5. Exemplify case studies, citing real world scenarios with specified examples in field.

**Course content**

This course will contextualize the meaning and origin of systems thinking in environmental management studies, define the different types of systems and their applicability, explain the traditional (reduction) science and holistic (system thinking) and give out the different characteristics of systems. The tools for systems thinking using the concept of system dynamics especially in its application to solve real life problems will be gained. It will also cover holistic approaches in relation to environmental management problem solving.

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**BUK-EVM 504 Advanced Remote Sensing (2 Units; Elective; L = 15; P = 45)**

**Senate-approved relevance**

The foundational knowledge learned in the Principles of Remote Sensing course is built upon in the Advanced Remote Sensing course of a Bachelor's degree program in Environmental Management. Students gain a thorough understanding of the handling, analyzing, and interpreting of remote sensing data from the course, which focuses on more complex remote sensing topics. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

In a Bachelor's program in Environmental Management, the Advanced Remote Sensing course focuses on advanced subjects in remote sensing technology and its applications in environmental management. The course includes subjects like digital image classification, image processing and analysis, geospatial data analysis, and the use of remote sensing to environmental monitoring and management.

Students will receive practical experience in processing and evaluating remote sensing data as well as knowledge of various remote sensing platforms and sensors. The course's goal is to give students the technical know-how they need to process, examine, and interpret remote sensing data and then apply that knowledge to actual environmental management issues. The goal of the course is to assist students in acquiring the critical thinking and problem-solving abilities required for success in the environmental management and remote sensing fields.

**Objectives**

The objectives of the course are to:

1. Examine environmental management uses of remote sensing technologies.
2. Discuss data handling and evaluation using remote sensing.
3. Examine the function of remote sensing in the management and monitoring of the environment.
4. Discuss critical thinking and problem-solving abilities using remote sensing methods to tackle actual environmental management issues.
5. Discuss the principles and methods of remote sensing in order to prepare them for jobs in environmental management and remote sensing.

**Learning outcomes**

On completion of the course, students should be able to:

1. Apply appropriate tools and techniques to handle and interpret data from remote sensing.
2. Understand geospatial data analysis, digital picture classification and image processing and analysis.
3. Use remote sensing methods to solve environmental management issues.
4. Apply remote sensing techniques to actual environmental management issues to foster critical thinking and problem-solving abilities.
5. Acquire a solid foundation in the principles and methods of remote sensing in order to prepare students for employment in environmental management and remote sensing.

**Course contents**

Advanced Image Processing: This section discusses more complex methods for filtering, feature extraction, and multi-spectral data fusion when processing remotely sensed data. Hyperspectral Remote Sensing: This module discusses the fundamentals and uses of hyperspectral remote sensing. Topics covered include the usage of hyperspectral sensors, methods for data analysis, and applications in different applications such mapping of minerals and vegetation. LiDAR Remote Sensing: This module discusses the fundamentals and uses of LiDAR remote sensing. Topics covered include the use of LiDAR sensors, data analysis methods, and applications in a variety of industries, including topographic mapping and forestry. Radar Remote Sensing: This module discusses the fundamentals and uses of radar remote sensing, including how to use radar sensors, how to analyze data, and how to use it in a variety of domains like geology and urban mapping. Distance sensing: The techniques for analyzing time-series of remotely sensed data, such as change detection, trend analysis, and resource monitoring, are covered in this module. The use of remote sensing in the study of climate change is covered in this module, along with methods for keeping tabs on vegetation dynamics and methods for tracking changes in land use. The use of deep learning and machine learning will be more advantageous to the students. It will also become increasingly advantageous to use cloud-based programs like Google Colab and Google Earth Engine.

**Minimum Academic Standards**

GIS and Remote sensing laboratory needed with NUC-MAS requirement facilities.

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**BUK-EVM 509 Climate Change and Carbon Financing (2 Units; Elective; LH = 30)**

**Senate-approved relevance**

This course examines research, IPCC predictions and recommendations, multi-stakeholder activities, financial partnerships, and signals of upcoming responses to these issues. In this course, students will handle climate change-related risks and investment possibilities using both new and established financial market tools and techniques. In order to manage risks and seize new opportunities, it will also look at how to finance climate change resilience and mitigation. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The course provides an overview of the science of climate change, including the causes, impacts, and potential responses to the changing climate. Students learn about the mechanisms for mitigating and adapting to climate change, including carbon financing, which involves using financial incentives to reduce greenhouse gas emissions.

The course also covers the role of carbon markets in reducing greenhouse gas emissions and financing clean energy projects, as well as the various types of carbon credits and how they are traded and monitored.

**Objectives**

The objective of the course is:

1. To provide students with a firm grounding in the science of climate change.
2. Discuss the range of issues at stake in climate change and the application of finance to address it.
3. To examine the mechanisms for mitigating and adapting to climate change.
4. Examine the practices, procedures and tools from within the mainstream financial and corporate markets.
5. To examine the role of carbon financing in reducing greenhouse gas emissions and financing clean energy projects.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the causes and effects of climate change.
2. Understand the risk exposure in climate change as it affects sectors such as the economy, agriculture, education and health.
3. Understand the range of issues at stake in climate change and the application of finance to address it.
4. Understand the role of carbon markets in reducing greenhouse gas emissions.
5. Understand the financing of clean energy projects, as well as the various types of carbon credits and how they are traded and monitored.

**Course contents**

The course will focus on the science of climate change, including the causes, impacts, and potential responses to the changing climate. The mechanisms for mitigating and adapting to climate change, including carbon financing, which involves using financial incentives to reduce greenhouse gas emissions. The course also covers the role of carbon markets in reducing greenhouse gas emissions and financing clean energy projects, as well as the various types of carbon credits and how they are traded and monitored. It will also examine how asset owners and managers, banks, insurance companies, venture capitalists, corporations and government agencies are becoming increasingly engaged in the financing of climate change mitigation and resilience in order to manage risks and capitalize on new opportunities. The overall objective of the course is to provide students with an understanding of the impact of climate change on the environment and the tools or mechanisms for mitigating and adapting to climate change, and the role of carbon financing in reducing greenhouse gas emissions and financing clean energy projects.

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ENVIRONMENTAL MANAGEMENT

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**EVM 506 Environmental Planning and Protection** **(2 Units; LH= 30)**

**Senate-approved relevance**

Production of high-quality graduates with the necessary skills to carry out the environmental planning process of making appropriate time and spatial arrangements relating to people's activities and environments according to social and economic laws, ecological and geographical theory in order to achieve sustainable development. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

Environmental planning is the process of making appropriate time and spatial arrangements relating to people's activities and environments according to social and economic laws, ecological and geographical theory in order to achieve sustainable development (Jin, 2014). Environmental planning is underpinned by the principles of sustainable development. Comprehensive environmental planning must ensure that environmental developments are built and operated sustainably. Roads, buildings, housing, and utility plants should not excessively deplete natural resources, damage the natural environment, or jeopardize people's health and safety.

It is a diverse activity that comprises multiple approaches and engages a wide range of stakeholders. Understanding environmental planning therefore requires not only an appreciation of interdisciplinary, but also of the relationship between different environmental sectors and stakeholders. This course explores various environmental planning principles and approaches applied in order to address developmental challenges related to but not limited to climate change, flooding and the environmental impacts of capital developmental projects.

**Objectives**

The objectives of the course are to:

1. Examine the role of environmental planning in the achieving sustainable development, with a particular focus on capital projects, climate change mitigation and adaptation.
2. Discuss environmental law in addressing environmental challenges.
3. Explain the Environmental Impact Assessment (EIA) tool and its contribution to the management of environmental impacts associated with capital projects.
4. Discuss the increasing environmental problems.
5. Examine environmental laws and sustainable development.

**Learning outcomes**

On completion of the course, students should be able to:

1. Understand the role of environmental planning in achieving sustainable development, with a particular focus on capital projects, climate change mitigation and adaptation.
2. Explain the role of environmental law in addressing environmental challenges.
3. Demonstrate good understanding of Environmental Impact Assessment (EIA) processes and its contribution to the management of environmental impacts associated with capital projects.
4. Identify and explain the increasing environmental problems.
5. Understand environmental laws and sustainable development.

**Course contents**

This course explores the various approaches and principles of environmental management as applied to the profession. Environmental planning is a process that evaluates how the social, political, economic and governing factors involved with new developments might affect the natural environment. The three components of environmental planning that must be considered include: the current status of the environment, the vision for the project, and details of implementation taking into cognisance aspects of Personnel management, methods of financing of plans, implementing and managing land use plans (Political, technical, administrative requirements). Private sector participation in environmental management and project implementation, will be explored at the local and global context. The course will examine the role and influence of environmental law and governance on environmental planning and protection and how the practice of Environmental Impact Assessment (EIA) applies to Environmental Planning and Protection.

**Minimum Academic Standards**

Field work will form part of this course based on NUC-MAS requirement facilities.

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**BUK-EVM-505 Resource Recovery and Circular Economy (2 Units; LH= 30)**

**Senate-approved relevance**

Production of high-quality graduates with the necessary skills on resource recovery with a focus on waste minimization, material recovery, energy recovery, and material cycles. Ethical, social, legal, and economic issues are examined together with material recycling and circular systems. This is in line with BUK’s mission of addressing African developmental challenges through production of well-rounded graduates with the right mind-set to think global and act local.

**Overview**

The need for resource management optimization is driven by the complexity and volume of resources exploited for global consumption that result in the generation of large volume of garbage.

The primary factors motivating this mobilization are the numerous pollution events and their associated negative environmental repercussions, as well as the growing concerns about climate change. This in turn necessitates the coordination of the actions of the various parties, including producers, regulatory bodies, customers, and waste management businesses.

**Objectives:**

The objectives of the course are to:

1. Examine the ways to recover resources and value from waste, including materials, energy and nutrients.
2. Examine the concept of circular economy means in theory and how it can be translated into practice.
3. Discuss the challenges around assessment of resource recovery and circular economy and the related decision making.
4. Examine the distribution, availability and geopolitics of natural resources.
5. Discuss the reuse, upgrade, remanufacture, recycling of product and process design for circular use.

**Learning outcomes**

Upon successful completion of this course, the students should be able to:

1. Understand the principles and practices in relation to current and emerging challenges that come under circular economy.
2. Understand the challenges associated with the applicability of circular economy to waste management.
3. Understand the challenges around assessment of resource recovery and circular economy and the related decision making.
4. Understand the distribution, availability and geopolitics of natural resources.
5. Apply problem solving skills with focus on sustainability and the circular economy.

**Course Content**

This course introduces the students to the concept of seeing human-generated waste material and energy as valuable resources, and to the emerging practices related to the circular use of resources. Distribution, availability and geopolitics of natural resources; waste production and waste hierarchy; environmental impacts; incentives for recovery; classifying waste, challenges associated with large-scale recovery; thermodynamics of waste and resource recovery. Detailed examples of resource recovery will be discussed, Environmental, health and safety considerations, local and international regulations. Circular use of resources and circular economy: reuse, upgrade, remanufacture, recycling; product and process design for circular use.