**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**30% Addition to the CCMAS Course Structure/Summary**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **LEVEL 200** |  |  |  |  |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-MET 204 | Instruments and Environmental Measurements | 2 | C | 15 | 45 |
| BUK-GEO208 | Introduction to Geographic Information Systems | 3 | C | 15 | 45 |
| BUK-GEO 201 | The Kano Region | 2 | C | 30 |  |
| BUK-GEO 206 | Introduction to Cartography and statistical mapping | 3 | E | 15 | 45 |
|  | **Total Core** | **7** |  |  |  |
|  | **LEVEL 300** |  |  |  |  |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-MET 311 | Atmospheric Radiation | 3 | C | 30 |  |
| BUK-MET 312: | Analytical Techniques in meteorology | 2 | C | 30 |  |
| BUK-MET 313 | Meteorological Disaster | 2 | C | 30 |  |
| BUK-GEO 314 | Introduction to Hydrology | 2 | E | 30 |  |
|  | **Total Core** | **7** |  |  |  |
|  | **LEVEL 400** |  |  |  |  |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-MET 404 | Boundary Layer and Turbulence | 3 | C | 30 |  |
| BUK-MET 405 | Synoptic Analysis & Current Weather II | 2 | C | 30 |  |
| BUK-MET 406 | Aeronautical Meteorology | 2 | C | 30 |  |
| BUK-EVM 407 | Environmental Monitoring System and Technique | 3 | C | 45 |  |
| BUK-EVM 408 | Environmental Education and Awareness | 2 | C | 30 |  |
| BUK-MET 413 | Population and Urbanization issues | 2 | C | 30 |  |
|  | **Total Core** | **14** |  |  |  |
|  | **LEVEL 500** |  |  |  |  |
| **Course Code** | **Course Title** | **Units** | **Status** | **LH** | **PH** |
| BUK-URP 522 | Soil Meteorology | 2 | E | 30 | - |
|  | **Total Core** | **8** |  |  |  |
|  | **GRAND TOTAL** | **36** |  |  |  |

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-MET204 Instruments and Environmental Measurements (2 Units C: LH 30)**

**Senate-approved relevance**

Production of high-quality graduates who are highly skilled and knowledgeable in some meteorological variables, their instrument and autographic instruments. Features of the Stevenson screen and meteorological enclosure. Students will be introduced to World Meteorological Organization (WMO) approved International codes, plotting of codes and converting plotting to code and to observation. Also simple care and maintenance of instrument. Exploring meteorological variables, instruments, care and maintenance are worth noting which is in line with BUK’s mission of addressing African development challenge by producing Codes, Observations and Plotting Practice graduates. This course developed from BUK being able to address global development and environmental challenge of climate change by understanding meteorological variables, instrument and their basic care and maintenance.

**Overview**

Handling instrument for data collection is vital to all core sciences. Meteorology involves use and handling various tool for data gathering. This course exposed students to tool handling in the early part of their career. The course is to introduce student elementary meteorological variables and their instrument, care and maintenance.

The students will be taught on how the meteorological instrument work and, care and precaution on each instrument. International codes approved by WHO will be introduced so that student can be able to plot meteorological weather charts and be able to convert it from plotting to code to observation and so on.

**Objectives**

The objectives of the course are to:

1. enumerate some elementary meteorological variables;

2. identify and explain some meteorological instrument;

3. examine the care and maintenance technique of meteorological instrument;

4. examine the basic features of some instrument;

5. identify and illustrate the meteorological code;

6. illustrate and describe how to plot meteorological weather chats; and

7. explain how to convert code to observation.

**Learning Outcomes**

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

1. list at least five elementary meteorological variables;

2. enumerate and explain six meteorological instruments;

3. examine the procedures for maintaining meteorological instrument;

4. examine the basic features of meteorological instrument;

5. with illustrate, identify some meteorological code by approved by WMO;

6. describe how meteorological weather chats can be plotted; and

7. explain how to convert code to observation.

**Course Contents**

Basic meteorological variables (wind, visibility, weather, temperature etc.). Few derived variables (QFF, QNH, Dew point etc). Simple meteorological instruments (Thermometer, wind vane, sunshine recorder, hygrometer etc). Autographic Instruments: - Barograph, Thermograph, hygrograph, Pressure – dine anemograph etc. Simple care and maintenance of the instruments. Features of the Stevenson screen and meteorological enclosure (site, location, exposures of instruments e.g. rain gauge etc.). WMO approved International Codes (AAXX), (PPAA & PPBB) and ((TTAA), (TTBB)). Plotting of codes on meteorological weather charts. Ease of converting from plotting to codes to observation and vice versa.

**Minimum Academic Standards**

Field and meteorological station equipment with a NUC-MAS requirement facilities

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-GEO 211: The Kano Region - (2 Units C: LH 30)**

**Senate-approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in the Geography of their immediate environment-The Kano Region. This gives the students first-hand information on the physical and socio-economic aspect of the environment which can be adopted and replicated for other environments anywhere in the world. Relevance is seen in how students of BUK can use the knowledge of the immediate environment in combating many social and environmental problems within and outside the region.

**Overview**

The Kano region is important in exposing students to the general geography of the Kano region which includes Kano and Jigawa states. It is very vital for student to appreciate geography of their immediate environment. The course covers both physical and human features that characterise the region.

History of the evolution of the region gives room for knowing the trend of change and challenges faces in the region over time. Aspects of settlement pattern, population, transport other socio economic activities of the region gives the students the leverage to see what the problems of planning are and what need to be done for sustainable planning.

**Objectives**

The objectives of the course are to:

1. delineate Kano Region
2. List important physical and human attributes of the region
3. Trace the historical evolution of the region
4. Highlight some economic potential of the region
5. Identify and explain some development challenges the region faces

**Learning Outcomes:**

This course introduces students to the general Geography of the Kano region which comprises of the present day Kano and Jigawa. At the end of the course, the students should be able to:

1. describe the physical geography of the region in terms of its climate, vegetation, hydrology, soil, geology and landforms
2. describe the pattern of population, settlement, transportation and the nature of the people and their religious landscape
3. give an account of the evolution of and the changes/transformation of the Kano region and how such changes impact on socioeconomic activities and livelihoods of the region

**Course Contents**

An introduction to the Kano region aiming at relating literature, lectures and field work, and to illustrate the concept of the region and physical environment: Weather and Climate, hydrology, soils and landforms as well as vegetation. Production, land use, population distribution and growth, and settlement patterns in rural and urban areas; the historical evolution of the Kano Close-settled Zone and the nature of rural-urban relations; transportation, Industrialization, urban expansion and the predicament of agriculture are studied

**Minimum Academic Standards**

Fieldwork is required for this course in line with NUC-MAS standard.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-GEO 206 Introduction to Cartography and Statistical Mapping (3 Units E: LH 30)**

**Senate-approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in the map making and spatial statistcs in Nigeria are in agreement with BUK’s mission to address African developmental challenges in producing technically based student that specialised in to Geotechnology and geoinfomatics from BUK that can develop a technique in the map making which can help in national planning and development.

**Overview**

Cartography as a science of map making provide candidates with skill that can make him stand alone especially in the environment and development cycle. This is very essential considering the important role mapping play in the display and communicating meteorological data.

Candidate participating in the course will acquire skills needed for development. The skills can help the student in the production and interpretation of maps that utilised by the civil Engineers, Geologist, Geomorphologies, and Soil geographers among others.

The objectives of the course, learning outcomes, and contents are provided to address this need:

**Objectives of the course**

Student participating in the course should at its end be able to:

1. explain why maps are essential for meteorology and related field
2. learn element of map making such as symbolization and lettering
3. possess skills of map making
4. have technical know-how on map interpretation
5. demonstrate basic statistical skill to handle meteorological data

### Learning Outcomes

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

1. explain the basics of cartography and maps
2. be able to read and interpret maps
3. be able to draw maps and insert geographic features on it

**Course Contents**

The use of symbols, graphs and other techniques to represent geographical phenomena on maps, isopleths, chloropleth and dot maps, line, poly and pie graphs, proportional circles, spheres and cubes, techniques in representing climatic, relief, population, settlement and economic data. Laboratory work forms part of this course.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-GEO 208 Introduction to Geographical Information Systems (3 Units C: LH 30) .**

**Senate-approved relevance**

Training of high-quality graduates with knowledge of GIS is very fundamental in all field that dealt in spatial data this agreement with development agenda of Nigeria as a country are in agreement with BUK’s mission to address African developmental challenges in producing technically based student that specialised in to Geotechnology and geoinfomatics from BUK that can develop a technique in the map making which can help in national planning and development.

**Overview**

As a field that demonstrate application of computer in handling any data where location is a factor, there is need to introduce every student to the field of GIS as part of his training. The essence of this course is to expose candidates to the application of GIS in handling spatial data particularly those related to climate.

### This covers meaning as well as historical evolution of GIS as a field that treat locational data. Components of GIS are taught in the course. Different sources of data for GIS are treated. Student would learn about ways of structuring data in GIS, advantage and disadvantage of each are taught. Also the candidate would learn applications of GIS particularly in climatic studies. Finally, practices are conducted.

### Objectives

At the end of the course, the candidate should be able to:

1. define GIS
2. List components of GIS
3. explain the application of GIS
4. describe database in GIS
5. carryout some GIS analysis with little guide

### Learning Outcomes

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

1. describe the development of GIS
2. identify five component of GIS
3. explain the concept of database in GIS
4. List at least five application of GIS
5. demonstrate knowledge of GIS in handling spatial data

**Course Contents**

This course introduces students to the development of Geographic Information System (GIS) and the key concepts and principles relevant to it. Historical development of GIS: Component of GIS, computer operation and computerization of geographical data, organizing data, nature, types, and structure of data. Geospatial database concepts. Database file types, database structure. Geospatial database management and manipulation. Laboratory work forms part this course.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK – MET 311 Atmospheric Radiation (3 Units C: LH 30)**

**Senate Approved Relevance**

Training of high quality graduates who are highly skilled and knowledgeable in the area of both solar and thermal radiation to determine the flow of electromagnetic energy before the sun and the earth are in agreement with BUK mission to address African developmental challenges in protecting environment against influence of aerosols that are been impacted to the atmosphere.

**Overview**

Radiation is very important in weather climate system. This most fundamental when one considers how energy transfer is key parameter in weather production. The course provides fundamental physical understanding and quantitative analysis of radiative in the atmosphere.

The course discusses radiation processes- reflection, refraction, absorption, transmission, emission, and scattering and introduces tools for atmospheric radiative transfer calculations. Provide students the basics for more advanced topics such as remote sensing or satellite meteorology.

**Objectives**

The objectives of the course are to;

1. Explain the importance of the radiation
2. Explain the different processes involves during the flow of electromagnetic energy between the sun and the earth.
3. Differentiate between the solar radiation and terrestrial radiation.
4. Find out the relevance of atmospheric radiation in research industries
5. Explain the application of atmospheric radiation in the treatment cancer in particular.

**Learning Outcome**

On Completion of the course, students should be able to;

1. Describe how atmospheric radiation is flow, absorbed and more around the earth.
2. What is atmospheric radiation
3. What is the significance of atmospheric radiation to the environment.
4. What is the basic energy flow in the atmosphere
5. How is heat transferred in the atmosphere
6. Enhance inability to understand and critically analyze current literature on radiation.
7. Gain awareness of the interconnections of radiation transfer and atmosphere science.
8. Ability to develop simple conceptual models as a guide to understanding atmospheric radiation.

**Course Contents**

Introduction to the physics of atmospheric radiation and remote sensing, including use of computer. Radiative transfer including emission. Basic of radiations electromagnetic spectrum. Basic of the earth atmosphere. Absorption and emission. Radiation and climate, Equation of radiative transfer and its solutions & Practical**.**

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK – MET 312 Analytical Technique in Meteorology (2 Units C: LH 30)**

**Senate Approved Relevance**

The university intends to train high quality and successful graduate knowledgeable on weather focus to enhance national development. Proper knowledge of weather is very vital, because weather affects everyone’s personal life. BUK mission address the challenges of weather focus as it affects everyone.

**Overview**

Analytical Technique in Meteorology is important because of the nature of meteorological data being comprehensive and enormous. This course guides candidate on the analysis of the meteorological data using both descriptive and inferential statistics.

Knowledge of Meteorology are vital as it helps us to understand how earth’s atmosphere works and often use the knowledge for future predictions. The study of meteorology is very important to help us safe and the economy up. The course is designed to expose students in the area of both air and marine transportation. The study is important because of the impact of air conditions on life, the preparation of extreme weather conditions to prevent disasters.

**Objectives**

The objectives of the course are to;

1. Understand the impacts of climate change and its effects to environment.
2. Assist in finding the solutions, posed by weather to agricultural, energy and aviation industries.
3. Assist emerging managers in disasters planning and management.
4. Explain better understanding of earth science education
5. Analyze, monitor and predict air pollution.
6. Assess the impact on climate and weather to human population.

**Learning Outcome**

On completion of the course students should be able to;

1. Explain and communicate weather forecasts
2. Demonstrate empirical knowledge of atmospheric phenomenon
3. Develop and apply critical and analytical thinking to solve problems in the atmospheric sciences.
4. Explain the principles behind, and use of meteorology instruments.
5. Demonstrate general knowledge and understanding of some of the basic facts, concepts relating to meteorology.
6. Becomes ambassadors for weather and climate issues.

**Course Contents**

Introduction to the atmospheric sciences, include atmospheric chemistry and physics. It focus majorly on weather. Impact on human population, it impacts on condition of life and have vital role in urban administration. It is important to farmers, since crop need water.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK – MET 313 Metrological Disaster (2 Units C: LH 30)**

**Senate Approved Relevance**

Training of high quality graduates who are highly skilled and knowledgeable in the area of in the area of how Earth’s atmosphere works and to use the knowledge for future predictions are in agreement with BUK mission to tackled how climate change has affected the ecosystem for the benefits of humanity.

**Overview**

Knowledge of Meteorology Disaster are vital as it helps us to understand how earth’s atmosphere works and often for future predictions. It also expressed the composition, structure and air motions within the atmosphere.

Meteorology is very important because weather affects everyone’s personal life, property, businesses and the economy. The course is designed to expose students on the knowledge of preparation of extreme weather conditions. As we know, the windy weather affect planes and ships lightening can be dangerous for planes, which affects the most fastest means of transportation and consequently human development.

**Objectives**

The objectives of the course are to;

1. Take precautionary measure against the effects of natural disasters.
2. Bring sustainable development of natural resources
3. Promote agricultural and food production
4. Take precautionary measures and minimize the effects of natural disasters.
5. Ensure efficient operation in natural defence industry and health related issues.

**Learning Outcomes**

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

1. Explain and communicate weather forecast.
2. Demonstrate empirical knowledge of atmospheric phenomenon
3. Able to understand basic principles of weather observation
4. Develop and apply critical and analytical thinking to solve problems in the atmospheric sciences.
5. Having a good knowledge on the contribution of meteorology for solving environmental problems.
6. Because ambassadors for weather and climate issues.

**Course Contents:**

Metrology is a fascinating subjects it include the study of land, atmospheric pressure, cloud formation and storms. Impact of pollution on the environment, effects of weather, cloud formation, wind forces and global weather patterns. Effects of pressure fronts that create hurricanes, tornadoes and cyclones. Also involve the impact humanity has on our own local climate and weather. It also introduces the fundamental physical in the atmosphere-heat and energy, temperature, pressure, winds, clouds, precipitation and stability.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-GEO 314: Introduction to Geographical Hydrology (2 Units E: LH 30)**

**Senate approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in hydrology of the world with emphasis on forms and availability, global hydrological cycle and the concept of balance are in line with BUK’s mission to address African development challenge in floods and flood control, river regulation through the basin hydrological cycle and balance, stream responses to rainfall input. BUK hydrologist are able to identify ways of sediment generation and sediment transport, floods control and types of aquifer within the surrounding environment.

**Overview**

Geographical hydrology is a very important concepts used in monitoring surface and ground water hydrology, with particular reference to river basins. Water, its forms and availability, global hydrological cycle and the concept of balance in Nigeria was found to be very important processes.

This exposed the students to different Rivers and their basins; basin hydrological. cycle and balance, stream responses to rainfall input; typical hydrographs and unit hydrographs Also to improve understanding of the students in the area the course also identifies ways of sediment generation and sediment transport: types of sediment and mode of transport, floods and flood control, river regulation. The objective of the course, learning outcomes and contents are provided to address the need of the course.

**Objectives**

A student who has successfully gone through this course should be able to:

1. identify the basic concepts of surface and subsurface water.
2. describe the forms and availability water, water cycle and balance;
3. examine flow dynamics on the surface, through and ground flow;
4. explain rivers and their basin, basin hydrological cycle and balance, stream responses;
5. identify economic importance of water bodies and their modifications
6. identify ways of sediment generation and sediment transport; types of sediment and mode of transport

**Learning Outcomes**

A student who has successfully gone through this course should be able to:

know the basic features of philosophy as an academic discipline;

2. identify the basic concepts of surface and subsurface water

3. describe the forms and availability, water cycle and balance;

4. examine flow dynamics on the surface, through and ground flow;

5. explain rivers and their basin, basin hydrological cycle and balance, stream responses;

6. identify ways of sediment generation and sediment transport; types of sediment and mode of transport

**Course Contents**

Basic concepts in surface and ground water hydrology, with particular reference to river basins. Water, its forms and availability, global hydrological cycle and the concept of balance are described. Moreover, this course examines flow dynamics on the surface, through and groundwater flow as well as their characteristics. Rivers and their basins; basin hydrological cycle and balance, stream responses to rainfall input; typical hydrographs and unit hydrographs are all taught. The course also identifies ways of sediment generation and sediment transport: types of sediment and mode of transport, floods and flood control, river regulation: types and their effects, groundwater hydrology: types of aquifer; factors of groundwater storage. Field course forms a part of this course.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK- MET 404: Boundary Layer and Turbulence, (3 Units; Core; L = 30; P = 0)**

**Senate-approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in boundary layer and turbulence is crucial in the field of meteorology in Nigeria are in agreement with BUK’s mission to address to help meteorologists better understand the transfer of heat, moisture, and momentum between the Earth's surface and the atmosphere. Understanding the boundary layer is important for making accurate weather predictions, as many meteorological processes, such as temperature inversion, take place within this layer. Turbulence is prevalent in the atmosphere and can have a significant impact on weather patterns and the exchange of energy and moisture between the surface and the atmosphere. Therefore, teaching students from BUK about boundary layer and turbulence is essential for preparing them for careers in meteorology and related fields, as well as for improving the overall understanding of the atmosphere and weather.

**Overview**

The boundary layer is a layer of fluid in the immediate vicinity of a solid surface, such as a wing or a fuselage, where the effects of viscosity are significant. This layer is characterized by slow-moving, laminar flow close to the surface and a more rapid, turbulent flow further away from the surface. Turbulence is a chaotic, random motion of fluid particles caused by the interaction of various flow components, such as vortices, eddies, and other disturbances. In the context of the boundary layer, turbulence is caused by a combination of factors, including the pressure gradient along the surface, the interaction of the fluid with the surface, and the flow of fluid over obstacles or through narrow passages.

Turbulence can have a significant impact on the performance and stability of a fluid flow, and is particularly important in many engineering applications, such as aerodynamics, heat transfer, and fluid mechanics. For example, turbulence in the boundary layer of an aircraft wing can cause significant drag, which can reduce the efficiency of the aircraft and increase fuel consumption. In contrast, in some industrial processes, turbulence is intentionally created to enhance heat transfer, mixing, and other desirable fluid flow characteristics. Therefore, understanding the behaviour of the boundary layer and turbulence is important in many areas of science and engineering, and much research has been conducted to develop mathematical models and experimental techniques to study these phenomena.

**Objectives**

The objectives of the course are to:

1. describe principles and control of soil erosion from water and air/wind
2. conduct analysis on the sediment transport and geographical distribution of soil erosion.
3. conduct practical exercises on the impacts of soil erosion on arid and semi-arid soils
4. state the theory and measurement of soil water content, movement, storage, and plant availability
5. describe operational principles and maintenance of soil erosion control techniques
6. describe flood control measures
7. explain the primary causes and consequences of a wide range of soil degradation problems
8. identify soil and water management practices that can mitigate climate change
9. distinguish the relationship between soil erosion and climate change
10. explain water conservation methods

**Learning outcomes**

The learning outcomes of studying boundary layer and turbulence in fluid mechanics and related fields can be grouped into several broad categories:

1. Understanding the physical concepts: This includes developing an understanding of the fundamental physical laws and principles that govern fluid flow in the boundary layer, such as the Navier-Stokes equations, the laws of conservation of mass and momentum, and the concept of viscosity.
2. Analyzing flow patterns: Students will learn how to analyze and predict the behavior of fluid flow in the boundary layer, including laminar and turbulent flow, as well as how to identify and quantify various flow features, such as vortices, eddies, and separation points.
3. Modeling and simulation: Students will learn how to use computational fluid dynamics (CFD) tools and numerical methods to model and simulate fluid flow in the boundary layer, including the development and application of turbulence models.
4. Experimentation and data analysis: Students will learn how to design and conduct experiments to study the boundary layer and turbulence, as well as how to analyze and interpret the data obtained from these experiments.
5. Applications: Students will learn about the practical applications of boundary layer and turbulence research, including its importance in areas such as aerodynamics, heat transfer, and fluid mechanics. They will also learn about the various engineering challenges associated with the control and management of turbulence in these applications.

Overall, the learning outcomes of studying boundary layer and turbulence will provide students with a solid foundation in fluid mechanics and related fields, as well as the skills and knowledge necessary to tackle a wide range of practical problems in these areas.

**Course Contents**

Simplifications used in describing the boundary layer. Constant and variable eddy viscosity. Wind profile near the surface; Ekman spiral. Log and power laws for neutral stability Roughness length. Stability parameters: Richardson’s number (Ri), and its flux form; Monin-Obukhov parameter, Z/L, and its relation to Ri. Similarity theory. Dispersion of pollutants in boundary layer (e.g. smoke, dust). Specification of turbulent fields: velocity correlation and cross-correlations (with temperature and moisture). Turbulent energy equation. Eddy transfer coefficients. Turbulent transports of heat, moisture and momentum. Flux profiles. Bowen ratio and Penman’s formula for heat and evaporation estimates. Importance of eddy transports especially for agriculture and tropical weather systems.

**Minimum Academic Standards**

Soil and water engineering laboratory with a NUC-MAS requirement facilities.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-MET 405: Synoptic Analysis & Current Weather II (2Units; Core; L=30; P=0)**

**Senate-approved relevance**

Synoptic analysis and current weather are critical components of aeronautical meteorology. Producing skilled and knowledgeable graduates in this sub-field of study in Nigeria is in tandem with BUK’s mission to address and help meteorologists better understand the general weather patterns over a large region, including high and low pressure systems, fronts, and other weather features. This information is used to make forecasts for specific areas and to identify potential weather hazards. Current weather, on the other hand, refers to the current conditions of the atmosphere at a specific time and location. This information is important for flight planning, as it provides a real-time snapshot of the weather conditions along a specific flight path. Therefore, teaching students from BUK about synoptic analysis and current weather are crucial for aviation safety, as they help meteorologists to understand the overall weather patterns and conditions, and to make informed decisions about flight planning and potential weather hazards. They are also essential for air traffic control, as they provide the information needed to manage air traffic and ensure safe and efficient air travel.

**Overview**

Synoptic analysis and current weather are two important components of meteorology that provide important information for weather forecasting and aviation. Synoptic analysis is the study of large-scale weather patterns, including the movement of high and low pressure systems, fronts, and other weather features. Meteorologists use synoptic analysis to identify weather patterns over a large region and to make long-range weather forecasts.

This information is important for identifying potential weather hazards and for understanding the overall weather situation. Current weather, on the other hand, refers to the atmospheric conditions at a specific time and location. It includes information such as temperature, pressure, humidity, wind speed and direction, cloud cover, and precipitation. Current weather information is critical for aviation, as it provides real-time information about the weather conditions along a specific flight path. Together, synoptic analysis and current weather provide a comprehensive understanding of the weather conditions, which is essential for safe and efficient air travel. Meteorologists use both types of information to make informed decisions about flight planning, air traffic control, and potential weather hazards. By combining synoptic analysis and current weather information, meteorologists are able to provide accurate and timely weather forecasts, ensuring the safety and efficiency of air transportation.

**Objectives**

1. The large-scale atmospheric patterns and their impacts on weather conditions.
2. How to analyze and interpret synoptic weather maps to determine current weather conditions and predict future weather patterns.
3. The use of weather symbols and station models to understand and communicate current weather conditions.
4. The role of fronts, pressure systems, and weather systems in determining current weather conditions.
5. The principles of air masses, fronts, and jet streams, and how they influence weather patterns.
6. The use of satellite imagery and radar to observe and analyze current weather conditions.
7. The interpretation of upper-air data to understand atmospheric conditions aloft and to make predictions about future weather patterns.

**Learning Outcome**

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

1. Understanding the large-scale atmospheric patterns and their impact on weather conditions.
2. The ability to analyze and interpret synoptic weather maps to determine current weather conditions and predict future weather patterns.
3. Knowledge of weather symbols and station models to understand and communicate current weather conditions.
4. Understanding of the role of fronts, pressure systems, and weather systems in determining current weather conditions.
5. Knowledge of the principles of air masses, fronts, and jet streams, and how they influence weather patterns.
6. The ability to use satellite imagery and radar to observe and analyze current weather conditions.
7. The ability to interpret upper-air data to understand atmospheric conditions aloft and to make predictions about future weather patterns.

In summary, by studying synoptic analysis and current weather, students will gain a comprehensive understanding of the factors that determine current weather conditions, and will have the skills to use this knowledge to make informed weather predictions.

**Couse Contents**

Low Level Forecasting: forecast for take-off forecast for landing, wind shear and turbulence forecasting. Sutcliff development areas. A-geostrophic systems and their implications in forecasting. Forecasting of all meteorological parameters and systems (wind, visibility, fog, turbulence squall lines, Thunderstorms etc). Flight documents preparations. Briefing, de-briefing and use of AIREP. Role of jet streams in forecasting. Forecasting indices.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-MET 406: Aeronautical Meteorology (2 Units; Core; L = 30; P = 0)**

**Senate-approved relevance**

Training graduates in the knowledge and skills of aeronautical meteorology in BUK is crucial for ensuring the safety, efficiency, and comfort of air travel including Flight planning and routing, Flight safety, Flight efficiency, Air traffic management and Environmental impact. The relevance of understanding aeronautical meteorology lies in its critical role in ensuring the safety, efficiency, and environmental sustainability of air travel. By providing information on weather-related factors that can affect flight operations, aeronautical meteorology helps to ensure that aircraft can safely and efficiently transport passengers and cargo to their destinations. Therefore, teaching students from BUK aeronautical meteorology as they help meteorologists to understand the overall weather patterns and conditions, and to make informed decisions about flight planning and routing, t safety, efficiency, Air traffic management and Environmental impact. It is also essential for air traffic control, as they provide the information needed to manage air traffic and ensure safe and efficient air travel.

**Overview**

Aeronautical meteorology is the study of atmospheric phenomena and their impacts on aviation. It plays a crucial role in ensuring the safety and efficiency of air transportation. The main objective of aeronautical meteorology is to provide accurate and timely weather information to pilots, air traffic controllers, and other aviation stakeholders. Aeronautical meteorologists are responsible for forecasting weather conditions at airports and along flight routes, as well as issuing warnings for severe weather events such as thunderstorms, turbulence, and icing conditions. They use a combination of ground-based and satellite-based observing systems, numerical weather prediction models, and other tools to monitor and predict weather conditions. Aeronautical meteorology plays a crucial role in ensuring the safety and efficiency of air transportation, and meteorologists work closely with other aviation stakeholders to provide the best possible weather information and support to the aviation community.

In summary, the goal of aeronautical meteorology is to provide students with a comprehensive understanding of the meteorological factors that affect flight, and to equip them with the knowledge and skills needed to make informed decisions about flight planning and in-flight operations in the presence of adverse weather conditions.

**Objectives**

The learning objectives of aeronautical meteorology are to understand:

1. The meteorological factors that affect flight, including winds, turbulence, icing, thunderstorms, and low-level wind shear.
2. The sources and use of weather information for flight planning and in-flight decision-making.
3. The meteorological hazards associated with flight, including turbulence, icing, thunderstorms, low-level wind shear, and other severe weather phenomena.
4. The effects of weather on aircraft performance, including takeoff and landing, climb and descent, and en-route flight.
5. The use of weather radar, satellite imagery, and other meteorological tools to analyze and predict weather conditions during flight.
6. The interpretation of weather forecasts, weather charts, and other meteorological products to support flight planning and in-flight decision-making.
7. The use of weather data to identify areas of potential turbulence and icing, and to make informed decisions about flight planning and in-flight operations.

**Learning Outcome**

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

1. Understanding the meteorological factors that affect flight, including winds, turbulence, icing, thunderstorms, and low-level wind shear.
2. The ability to use weather information for flight planning and in-flight decision-making.
3. Awareness of the meteorological hazards associated with flight, including turbulence, icing, thunderstorms, low-level wind shear, and other severe weather phenomena.
4. Knowledge of the effects of weather on aircraft performance, including takeoff and landing, climb and descent, and en-route flight.
5. The ability to use weather radar, satellite imagery, and other meteorological tools to analyze and predict weather conditions during flight.
6. The ability to interpret weather forecasts, weather charts, and other meteorological products to support flight planning and in-flight decision-making.
7. Knowledge of how to use weather data to identify areas of potential turbulence and icing, and to make informed decisions about flight planning and in-flight operations.

In summary, by studying aeronautical meteorology, students will gain a comprehensive understanding of the meteorological factors that affect flight and will have the knowledge and skills needed to make informed decisions about flight planning and in-flight operations in the presence of adverse weather conditions.

# **Course Contents**

This course covers advanced streamline and isobaric analysis (Emphasis on Africa and her sub-regions); contour heights analysis; frontal analysis and X-sections; ascent analysis emphasizing convective systems. The course also looks at CODES METAR, TAFOR, ARFOR, ROFOR, & FIFO.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-EVM 407: Environmental Monitoring System and Technique (3 Units; Core; L = 30)**

**Senate-approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in environmental monitoring. Classification of monitoring technique and use, global resources, sinks and transport of both man-made and natural atmospheric trace components, reversible effect of human activities on the global environment in the arid and semi-arid areas of Nigeria are in agreement with BUK’s mission to address African developmental challenges in producing skilled environmental monitoring graduates. Relevance is seen in environmental monitoring graduates from BUK being able to develop environmental monitoring systems and techniques to mitigate environmental problems as a result of air pollution as well as development of air pollution control measures through best practices.

**Overview**

Principles of environmental monitoring techniques are a vital approach used in environmental problems monitoring as a result of air pollution, particularly in the arid and semi-arid areas of Nigeria. This highlights the importance of preparing students with the knowledge of the values of environmental monitoring and the skills of how to conduct environmental monitoring exercise.

This course is designed to expose students to different techniques for environmental monitoring for mitigating and preventing air pollution. Also, to build the capacity of students in the area of development of specific parameters to consider during environmental monitoring as well as write and interpret EIA and other environment monitoring reports.

The objectives of the course, learning outcomes, and contents are provided to address this need.

**Objectives**

The objectives of the course are to:

1. Define and explain the values of environmental Monitoring
2. identify the general principles of environmental monitoring.
3. Classification of monitoring technique and use.
4. identify key and development specific parameters to consider during environmental monitoring
5. Ability to write and interpret EIA and other environment monitoring report

**Learning Outcome**

At the end of the course, the student should be able to:

1. explain the values of environmental monitoring
2. describe the general principles for environmental monitoring
3. identify different techniques for environmental monitoring
4. identify key and development specific parameters to consider during environmental monitoring
5. Write and interpret EIA and other environment monitoring report

**Course Contents**

Definition, general principles of environmental monitoring. Organization of monitoring programmes for site and resource specific strategies. Classification of monitoring technique and use (physical, chemical and biological radioactivity) global resources, sinks and transport (mass balance) of both man-made and natural atmospheric trace components, ocean-atmosphere interactions, reversible effect of human activities on the global environment e.g. greenhouse effect, climate change, depletion of stratosphere ozone layer, acid rain. Air pollution meteorology, chemistry and biology. Atmosphere dispersion models. Elements of air pollution control. Sampling and air monitoring techniques. Mechanism of pollutant interaction with soil and vegetation. General principles of bio testing, aquatic toxicity, types, bio, assays, data analysis and interpretation.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-EVM 408: Environmental Education and Awareness (2 Units; Core; L=30; P= 0)**

**Senate-approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in Environmental education and awareness are crucial in today's world because they provide meteorologists and individuals with the knowledge and tools necessary to make informed decisions about the environment in Nigeria and are in agreement with BUK’s mission to help meteorologists better understand Environmental conservation, Climate change, Sustainable development, Health and well-being and Economic benefits. In summary, understanding environmental education and awareness is essential for individuals to make informed decisions that promote environmental protection, sustainable development, and personal health and well-being. Therefore, teaching students from BUK about Environmental Education and Awareness is essential for preparing them for careers in meteorology and related fields.

**Overview**

Environmental education and awareness involve the process of teaching individuals about the natural world and the relationship between humans and the environment. It aims to develop the knowledge, skills, attitudes, and values needed to understand and address environmental issues. Environmental education and awareness cover a broad range of topics, including climate change, pollution, habitat loss, sustainable development, and conservation. Environmental education and awareness can take place in various settings, including schools, universities, museums, zoos, and community centers. It can also involve formal and informal education, such as curricular activities, field trips, and public outreach programs.

The primary goal of environmental education and awareness is to promote environmental literacy, which refers to the knowledge, skills, and attitudes necessary to make informed decisions about environmental issues. This includes understanding the scientific concepts and principles underlying environmental issues, as well as the social, economic, and political factors that shape environmental policies and practices. Environmental education and awareness can also foster a sense of responsibility and stewardship towards the environment, leading to more sustainable behaviors and practices. It can inspire individuals to take action to protect the environment, such as reducing waste, conserving energy, and advocating for policy change. Overall, environmental education and awareness are essential for building a sustainable future that balances economic, social, and environmental goals.

**Objectives**

1. Knowledge: One of the primary learning objectives of environmental education is to provide individuals with knowledge about environmental issues, such as climate change, biodiversity loss, and pollution. This knowledge can help individuals understand the causes and consequences of environmental problems, as well as potential solutions.
2. Skills: Environmental education also aims to develop skills that enable individuals to take action to protect the environment. For example, individuals may learn how to conserve energy, reduce waste, or recycle materials.
3. Attitudes: Environmental education also aims to shape individuals' attitudes towards the environment. This includes promoting a sense of responsibility and stewardship towards the environment, as well as encouraging respect for nature and its resources.
4. Values: Environmental education also aims to instill values that support sustainable development and environmental protection. For example, individuals may learn the value of reducing their ecological footprint or the importance of preserving biodiversity.
5. Action: The ultimate goal of environmental education is to inspire individuals to take action to protect the environment. This may involve individual actions such as reducing personal waste or community-based actions such as participating in local conservation projects.

In summary, the learning objectives of environmental education and awareness are to provide knowledge, develop skills, shape attitudes and values, and inspire action to promote environmental protection and sustainability.

**Learning outcomes**

The learning outcomes of teaching environmental education and awareness may vary depending on the specific goals and target audience, but in general, they aim to achieve the following:

1. Increased knowledge and understanding: Teaching environmental education and awareness can lead to an increased understanding of environmental issues, such as climate change, pollution, and habitat destruction. Learners can develop a deeper understanding of the causes, consequences, and potential solutions to these issues.
2. Improved critical thinking: Environmental education can also improve learners' critical thinking skills, enabling them to analyze and evaluate complex environmental issues. This can help learners develop informed opinions and make sound decisions about environmental issues.
3. Changed attitudes and values: Environmental education can also lead to a change in attitudes and values towards the environment. Learners can develop a sense of responsibility and stewardship towards the environment, leading to more sustainable behaviors and practices.
4. Increased awareness of personal impact: Environmental education can also increase awareness of learners' personal impact on the environment. This includes understanding how daily activities and choices can impact the environment, and how to make more sustainable choices.
5. Increased engagement and action: The ultimate goal of environmental education is to inspire learners to take action to protect the environment. This can include individual actions such as reducing personal waste, community-based actions such as participating in local conservation projects, or advocacy for policy change.
6. In summary, the learning outcomes of teaching environmental education and awareness are increased knowledge and understanding, improved critical thinking, changed attitudes and values, increased awareness of personal impact, and increased engagement and action towards environmental protection and sustainability.

**Course contents**

The course examines the principles of environmental education involving policies for environmental education; its role in sustainable development (DESD) 2005 to 2014 and what was/is made of it. It explains methods for executing environmental education both formal and informal education. Pollution and environment (responsible use). Role of educational intervention in environmental action. Methods of dissemination of environmental information to various target groups. Methods of public opinion assessment . Social theory of participation, social response to environmental pollution, environmental damage and compensation.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-MET413 Population and Urbanization issues (2 Units C: LH 30)**

**Senate-approved relevance**

Training of high-quality graduates who are highly skilled and knowledgeable in human population and relationship between population, urbanization and meteorology. Various changes witnessed in human history, from Neolithic through agricultural, industrial and information age. Examination of some population development theories such as: demographic transition theory and development theories like Malthusians, Neo-Malthusians and anti-malthusians theories. The pattern of population change and its accompanied urbanization leading general ecological and meteorological challenges. However, these are worth noting which is in line with BUK’s mission of addressing African development challenge by producing Population and Urbanization issues graduates. This course developed from BUK being able to address global development and environmental challenge such as drought, pollution, ozone layer depletion, desertification, global warming and deeming and rising of sea.

**Overview**

Key concept on population and urbanization and human development will be considered. The course is to introduce student on human population, urbanization and meteorology. Human development phases from Neolithic to information age will be focuses as well as some demographic transition will be explored.

The pattern of population growth and urbanization, from antiquity to present and future, form important issue student learn in this course. Influence of population, its dynamics and its accompanied urbanization which lead to environmental and meteorological problem. Environmental challenges like drought, desertification, ozone layer depletion and global warming are part development issues that affect meteorology which student need to learn.

**Objectives**

The objectives of the course are to:

1. define population, urbanization and meteorology;

2. identify and explain key concept of population and urbanization;

3. examine and explain human development theories;

4. examine the spatial distribution of population and urbanization;

5. identify the impact of population growth on environmental and meteorological variables; and

6. what is the future of human population growth.

**Learning Outcomes**

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

1. define population, urbanization and meteorology;

2. identify and explain key concept of population and urbanization;

3. examine and explain Malthusian, agricultural and industrial theories;

4. examine the distribution of population and urbanization;

5. what are the relationships between population, urbanization and meteorology;

5. identify the impact of population growth on environmental and meteorological variables;

and

6. examine the future of human population growth.

**Course Contents**

This course seeks to explore relationship between human population, urbanization and meteorology. Students are introduced to key concepts in population and urbanization. Human development phases from Neolithic through agricultural, industrial and information age form part of this course. Demography transition theories and development theories such as Malthusians, Neo-Malthusians and anti-Malthusians will be examined. The course examines trends of population growth and urbanization from antiquity to present as well as future. It examines how population change and its accompanied urbanization lead to general environmental problem and meteorological problem in particular. Issus such as air pollution, drought and desertification, ozone layer depletion, global warming, deeming and raising sea level will be examined in relation to population change and urbanization. The course finally examines future of human population on planet earth.

**Minimum Academic Standards**

Field and meteorological station equipment with a NUC-MAS requirement facilities.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

# **BUK-MET 530: Aviation Meteorology (3 Units C: LH 30; PH 0)**

**Senate-approved relevance**

Possessing good skill in aviation meteorology is very important to the state and its economy. Aviation sector need people with skill in data handling. This course is therefore in line with national development agenda. In line with NUC and Bayero University mission, creating man power for nation’s development is consider critical.

## Overview

The importance of Aviation Meteorology lies on the fact that air flight require detailed of up-to-date state of weather. Considering the importance of this study, Aviation Meteorology becomes imperative for every study of meteorology.

The focus of this course is current aviation weather concepts and modeling as applied to the flight. Topics considered include the evolution of weather theory, the impact of computer modeling systems and advances in weather data collection. In preparation for student flight application, weather hazards, pre-flight weather briefings, and in route weather reports are also studied. Applying the above concepts will facilitate appropriate decision making in flight based operations

**Objectives**

**At the end of the course, candidates should be able to:**

1. demonstrate knowledge of fundamental concepts of weather systems and weather generation and how the data is disseminated in current real-world applications
2. employ core weather data to analyze various predictions in weather modeling systems
3. demonstrate the fundamental principles of weather prediction and how they are operationally applied.
4. Demonstrate knowledge of the computational tools to solve operational weather problems.
5. Perform fundamental analysis of severe aviation weather using current online tools.
6. Find domestic and foreign sources of weather information  
    Demonstrate appropriate decision making skills

**Learning Outcomes**

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

1. explain basic ICE formation;
2. know weather perturbation and wind gust;
3. understand the effect of weather on aviation, visibility;
4. understand the coding system in meteorology;
5. write meteorological report for aviation purpose.

## Course Contents

Ice formation and growth on aeroplanes, Weather perturbations, Wind gusts and their effect on aviation, Visibility, Decoding meteorological codes, Meteorological reports for aviation.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

# **BUK-MET 502 Advanced Synoptic Meteorology (3 Units C: LH 30; PH 0)**

**Senate Approval**

Training of high quality graduates who are highly skilled and knowledgeable in the area of in the area of weather viewed at common point and time works and using the knowledge for future predictions are in agreement with need for industry and public sector. BUK mission s toward producing candidate that knowledgeable in their chosen fields.

**Overview**

Tropical cyclones and other meso-climatic event are becoming are recently intensified. This is attributed to climate change and other weather dynamic events. Responding to this require candidate with sound knowledge of the nature and state of the weather at synoptic scale. This course which is advance synoptic weather study aimed at detailed investigation and solution offering.

The interest in the course is to ensure advanced scalar analysis of meteorological variables. The course will explore conceptual models and analysis techniques for mesoscale atmospheric landscapes, cumulus convection and tropical storms. Specifically the course will focus on Tropics with bias to tropical Africa. Advanced arrangement of surface upper air charts to illustrate various synoptic situation and Kinematics analysis

**Objective**

The objectives are to:

1. provide skill for scalar analysis of meteorological variables;
2. explain the conceptual models of synoptic meteorology;
3. understand the process for mesoscale atmospheric structures; and
4. identify and explain some meteorological problems
5. proffer solutions to tropical cyclone and other events

**Learning Outcomes**

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

1. understand scalar analysis of meteorological variables;
2. explain the conceptual models;
3. understand the process for mesoscale atmospheric structures; and
4. identify and explain some meteorological problems

**Course Contents**

Advanced scalar analysis meteorological variables, Survey of conceptual models and analysis techniques for mesoscale atmospheric landscapes, cumulus convection and tropical storms. Exploration of Meteorological problem with specific focus on Tropical Africa. Advanced arrangement of surface upper air charts to illustrate various synoptic situation and Kinematics analysis

**Bayero University, Kano (BUK)**

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

# **BUK-EVM 531: Conservation of Natural resources (3 Units C: LH 30; PH 0)**

# **Senate Approval**

The need to conserve natural resources is becoming more amplified looking at population trend and urbanization the world faces. In developing countries like Nigeria this conservation is most needed considering the nature of the development which relies more on natural resources. Issues like: collection fuelwood and other fossil fuel, unsustainable agriculture and forest degradation and unplanned urbanism are critical to weather and climate. Student of meteorology should be able to chat and suggest way in conserving natural resources in order to influence sustainable development. This agree with the national education policy and mission of BAYERO University

**Overview**

This course will foster an understanding of the diverse ways organisms interact with the environment, the fundamental principles of ecology, evolution, and conservation of biodiversity on Earth. The course will look at role environment and environmental resource in maintaining balance within ecosystem. It will explore the contributions of the diverse groups of living organisms to ecological systems and human welfare and variety of lifestyles, traits, and solutions to the challenges of life. It Explore how populations of organisms change in abundance and distribution (population ecology). Issues of ecological interactions between species within communities (community ecology) as well processes and changes that occur at the level of ecosystems are to be explored.

The course will give emphasis to course and consequence of natural and man induce disasters. Theories on disaster cause will be explored to upturn candidate’s understanding. Sustainability and conservation are issues this course will give close attention to.

**Objectives**

The objectives of this course is to

1. create awareness on environmental problem
2. classify environmental problem
3. instil consciousness on resource conservation
4. provide candidate with skills to distinguish classes of natural resources
5. identify course and consequence of major environmental problem
6. explain SDGs on resource conservation
7. learn prevention and mitigation strategies for conserving natural resource

**Learning Outcomes**

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

1. explain basic definition and various forms of natural resources;
2. identify some environmental problems;
3. state magnitudes of over exploitations of resources;
4. understand the management strategies to environmental problems; and
5. identify association between people and resource control.

**Course Contents**

Natural resource management: Evolution as a discipline; objectives; scope and roles in achieving sustainable development. Key definition of terms and concept related to natural resources: what is a resource, resource types and classifications, terminologies in resource use, rates, and ways; limits of natural resources. Basic resources: Food resource, food problems, quality, quantity, and distribution; poverty; policy process in environmental resources; water and biological resources. Ecological problems: soil erosion; drought; salinity and, deforestation; and management strategies. Cowboy and spaceship Economy; conservation management; the concept of Tragedy of common in relation to environmental Degradation; cost benefit analysis; consequences of misuse of resources; and the relationship between population and resource management.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

# **EVM 533: Environment and Community Health (3 Units C: LH 30; PH 0)**

**Senate-approved relevance**

Possessing good knowledge of nexus of community health with environment is very important to the state and industry. This course is therefore in line with national development agenda. In line with NUC and Bayero University mission, creating man power for nation’s development is consider critical.

**Overview**

This course explores the relationship people have with their environment, the risk  
management choices made, and the resulting associations that affect health and physical well-being for the individual, communities and susceptible populations. The field of Environmental Public Health, itself, is a professional, interdisciplinary field focused on the science and practice of preventing injury and illness from exposures to hazards in our environments.

Primarily, students will learn how a variety of environmental factors impact health  
outcomes, the control measures currently used to prevent or minimize the health effects from these negative impacts, and where to access additional information to make a difference at the individual, community or higher level. The course is designed to acquaint the student with the scientific and technical foundations of the field, and examines both practice and research contributions to understanding and controlling environmental hazards.

**Objectives**

The objective are to:

1. undertand community health
2. classify nations base on community health status among the nations;
3. list the major variables affecting environmental health;
4. explain how environmental problems are spreading among the community; and
5. suggest the mitigation and remediation techniques environmental deterioration.

**Learning Outcomes**

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

1. define some community health concepts;
2. understand the distinction of community health status among the nations;
3. identify the major variables affecting environmental health;
4. understand how environmental problems are spreading among the community; and
5. explain the mitigation and remediation techniques environmental deterioration.

**Course Content**

Definition of concepts in community and public heath, Hinterland viewpoint of community health, influence of the environment and development on community heath, Agencies involved in international health, Distinction between community/public health in developed and less developed countries. The vicious circles of population pressure, malnutrition and infection, problem solving in the developing world, sources of community/public health problems in rural and urban areas in less developed countries: water availability/scarcity, vehicular emission, population increase, air pollution, sanitation: control of health problems arising from contamination of water, air in communities, spatial epidemiological approach to community/public health problems analysis, planning intervention program for community/public health problems.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

# **BUK-URP 521: Disaster management and Planning (2 Units C: LH 15; PH 0)**

**Senate Approval:**

Aggravated by climate and other environmental change, disaster are becoming so rampant in recent time, and is likely to with those of larger magnitude in future. Producing graduates with skilled in disaster management and planning will go a long way to address the current flood, drought and other extreme event. This is in agreement with need of private and public sector, as well as NUC and Bayero University.

**Overview**

**Course Overview:** Demographic changes, human settlement patterns, land-use decisions, and political and social policy dynamics have increased vulnerability to natural and man-made disasters. These disasters are largely climate related such as flood, drought, heat wave, desertification and tropical storm. Planning and policy processes and interventions can help reduce disaster vulnerabilities and increase resilience at every stage of the disaster management cycle: disaster mitigation, preparation, response, and recovery.

The course will focus look at traditional phases of disaster managemt, paying attention on how disaster planning and policy efforts can increase and promote resilience and reduce vulnerabilities. In the course of learning this course candidate will learn skill of disaster prediction, preparedness and communication strategies.

**Objective**

The candidate that offered this course should at the end be able to:

1. understand and distinguish various disaster concepts
2. classify disaster using different criteria
3. Understanding of the roles of the various phases of disaster management and issues concerning planning and policies in those phases
4. explain of comprehensive emergency management from a planning and policy perspective
5. state of the role of federal, state, and local governments in disaster planning and policies
6. describe of mitigation planning and policy strategies
7. understanding of comprehensive emergency management and related plans
8. list and explain of factors affecting short and long-term recovery and rebuilding and the role of planners and policy-makers

**Learning Outcomes**

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

1. understand some concept like disaster, hazard risk, vulnerability and resilience;
2. know various forms of natural disaster;
3. identify the cause and impact of natural disaster;
4. understand the disaster planning and management; and

**Course Contents**

Definition issues-natural disaster, hazard risk. Vulnerability, resilience, etc. Types of hazards and natural disaster –geologic, climatic, environmental, epidemics, accident, etc. Causes and effects of disaster. Planning for disaster preparedness. Conducting disaster management, measure of disaster risk reduction. Disaster management, mitigation, response and recovery measures/strategies. Case studies of disaster planning and management projects.

**Bayero University, Kano (BUK)**

**Earth and Environmental Science**

**Geography**

**BSc. Meteorology**

**BUK-MET522 Soil Meteorology (2 Units; Elective; L = 15; P = 45)**

**Senate-approved relevance**

Preparation of high-quality graduates who are highly skilled and knowledgeable in meteorology with reference to microscale part of meteorological range of soil. Monitoring of daily and seasonal pattern of temperature and their influence on microclimate. Identification of some soil services such as soil respiration and how it affect fluxes of soil carbon between pedosphere and atmosphere. Some ecosystem process within the pedosphere affects the chemical and biological function of the atmosphere. However, these factors affecting the composition and quality of the atmosphere are worth noting which is in line with BUK’s mission of addressing African development challenge by producing soil meteorology graduates. Field and laboratory work for data generation and simulation on soil carbon and heat fluxes are very pertinent for student to understand. The soil meteorology from BUK being able to address global development and environmental challenge of climate change by understanding the role of soil in carbon sequestration and it contribution in mitigating the global carbon emission.

**Overview**

The course is to introduce students to the role soil on meteorological process, as well as the interaction of pedosphere and the atmosphere. Understanding the impact of temperature fluctuation (Daily and annual) on soil microclimate is important component of this course. Soil ecological services and their impacts on soil carbon fluxes between pedosphere and atmosphere is explained. Temperature, soil moisture, precipitation and light are the factors affecting soil ecosystem processes and also modifying the composition and quality of the atmosphere, therefore understanding the factors and processes will enhance the student’s skill on how to mitigate and improve the quality of the atmosphere. Field and laboratory work are requires the measurement and analysis of soil and meteorological data.

The soil meteorology focuses on the microscale portion of meteorological spectrum of soil, those phenomena with spatial scale between subsurface and surface soil. Daily and seasonal pattern of soil temperature and how it modify soil microclimate. Ecosystem processes such as assimilation and soil respiration, and their roles on fluxes of soil carbon between pedosphere and atmosphere. Factors affecting ecosystem process in the pedosphere, such as: soil moisture, temperature, precipitation, light and nutrient availability and their role on quality of atmosphere. Soil heat flux and soil temperature are an important factors in biological and chemical function of atmosphere which this course considered. Field and laboratory activities to observe and quantify some element of weather, heat and soil carbon flux, and their impact on soil microclimate and atmospheric quality form the practical aspect of this course

**Objectives**

The objectives of the course are to:

1. explain soil meteorology;

2. identify and explain some ecosystem services of soil and their role on atmospheric carbon flux;

3. enumerate some meteorological variables affecting pedosphere;

4. examine the influence soil heat flux and temperature on the quality of atmosphere;

5. describe the interaction of pedosphere and atmospheric

6. illustrate and describe how meteorological variable upset some processes in the pedosphere.

**Learning Outcomes**

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

1. define and explain soil meteorology;

2. list and explain some ecosystem services of soil and their role on atmospheric carbon flux;

3. identify some meteorological variables affecting pedosphere;

4. describe the meaning and role of soil heat flux and temperature on the quality of atmosphere;

5. explain the pedosphere and atmospheric interaction; and

6. demonstrate how some meteorological variable upset some processes in the pedosphere.

**Course Contents**

The soil meteorology focus on the microscale portion of meteorological spectrum of soil, those phenomena with spatial scale between subsurface and surface soil. Daily and seasonal pattern of soil temperature and how it modify soil microclimate. Ecosystem processes such as assimilation and soil respiration, and their roles on fluxes of soil carbon between pedosphere and atmosphere. Factors affecting ecosystem processes in the pedosphere such as soil moisture, temperature, precipitation, light and nutrient availability and their role on quality of atmosphere. Soil heat flux and soil temperature as an important factors in biological and chemical function of atmosphere. Field and laboratory activities to observe and quantify some element of weather, heat and soil carbon flux, and their impact on soil microclimate and atmospheric quality.

**Minimum Academic Standards**

Soil and water laboratory, and field equipment with a NUC-MAS requirement facilities.