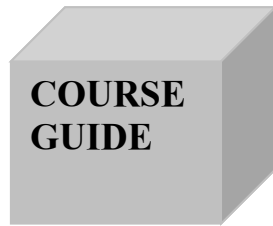




**SOS 203**

**INTRODUCTION TO  
AGRO-CLIMATOLOGY**

**Course Guide**

**SOS 203****INTRODUCTION TO AGRO-CLIMATOLOGY**

Course Writer/Developer	S. D. Musa Dept. of Geogrpahy Kogi State Universtiy Anyigba
Course Coordinator	Dr. N. E. Mundi School of Science & Technology National Open University of Nigeria Lagos
Course Editor	Dr. T. E. Ologunorisa
Programme Leader	Professor A. Adebajo School of Science & Technology National Open University of Nigeria Lagos

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

National Open University of Nigeria  
Headquarters  
14/16 Ahmadu Bello Way  
Victoria Island  
Lagos

Abuja Office  
No. 5 Dar es Salaam Street  
Off Aminu Kano Crescent  
Wuse II, Abuja  
Nigeria

e-mail: [centralinfo@nou.edu.ng](mailto:centralinfo@nou.edu.ng)  
URL: [www.nou.edu.ng](http://www.nou.edu.ng)

Published by:  
National Open University of Nigeria 2008

First Printed 2008

ISBN: 978-058-233-9

All Rights Reserved

<b>CONTENTS</b>	<b>PAGE</b>
Introduction.....	1
The Course.....	1-2
Course Aim.....	2
Course Objectives.....	2-3
Working through the Course.....	3
Course Material.....	3
Study Units.....	3-5
Text Books.....	5
Assessment.....	5
Tutor- Marked Assignment.....	6
End of Semester Examination.....	6
Summary.....	6

## **Introduction**

The study of climatology is fundamentally concerned with the weather and climate of any given area. Essentially, environmental scientists are interested in the processes which take place in the atmosphere because the processes affect the various components of the environment. Climatology has made enormous contributions towards ensuring that we have a good understanding and control of these processes.

The weather of a place refers to the atmospheric condition at a given point in time. Climate on the other hand is the synthesis of the weather of a place over a period of about 35 years. Climatology refers to the scientific study of climate. It is closely related to meteorology which is the science of the physical, chemical and dynamic state of the atmosphere. However, meteorology deals with the study of the weather while climatology is concerned with the climate.

This course as it is conceived here has to do with the understanding of the knowledge of certain aspects of climatology which are relevant to agricultural practices. Essentially, we are talking of agro climatology as implying the use of climatological data in ensuring the practical and effective management of agriculture.

## **The Course**

This course carries two credit units.

This course guide tells you briefly what to expect from reading this course material. The study of agro climatology may be described as the cross breeding of two disciplines, climatology and agriculture. The living components of the environment (particularly plants and livestock) respond in different ways to the atmospheric situations. It is these interactions between the atmospheric environment and the plants and livestock that constitute the major concern of agro climatology.

As mentioned earlier, climatology deals with the scientific study of climate that is the pattern of behaviours of the atmosphere over a long period of time. In terms of approach the study can be subdivided into regional climatology which is the description of climates over selected areas of the earth; synoptic climatology which relates the prevailing atmospheric condition to weather and climate; physical climatology which emphasises global energy and water balance regimes of the earth and the atmosphere amongst others.

Weather and climate being the focal point of climatology, the various components like rainfall, temperature, humidity, sunshine, wind amongst others will be examined. The controlling factors, altitude,

latitude, temperature, etc. of the different elements together with dynamics of the earth's atmosphere will also be discussed.

Radiation, the incoming and outgoing solar energy, determines the temperature of the various places on earth. Atmospheric moisture is the level of wetness of the atmospheric air; it determines the humidity of the air. The differential heating of the earth's surface results in the spatial temperature variation of pressure which eventually determines the direction of movement of the wind.

The processes of rainfall starts with an uplift expansion of warm air until it reaches saturation point. It reaches the climax when condensation of water vapour results in precipitation.

The temperature, daylight, radiation, rainfall and evapotranspiration will vary with season. The fluctuations are attributable to change in atmospheric conditions with season.

Measurement of the various elements of climate is done using specialised equipment like the thermometer, rain gauges, wind vanes, anemometers, sunshine recorders among others. These equipment are kept in various positions in a standard meteorological station (where they are monitored for the various data) and are properly maintained.

The tropics have relatively higher temperatures than other parts of the world. The warm climates have peculiar implications for agriculture particularly as it affects crops, livestock, irrigation, pests and diseases.

### **Course Aim**

The course aims to provide a good understanding of the climatic systems for a better management of agriculture.

### **Course Objectives**

After going through this course, you should be able to:

- Explain the nature and scope of climatology
- Explain the elements and factors of weather and climate
- Explain the dynamics of the atmosphere
- Appreciate the dynamics of pressure and wind systems.
- Appreciate the seasonal variations in the different factors of the climate
- Identify the equipment used to measure the various elements of climate and state how to maintain them

- Expressly state the relationship between climate and agriculture.
- 

### **Working through the Course**

This course has been carefully put together bearing in mind the fact that it is an introductory course. However, efforts have been made to ensure adequate explanation of the concepts and issues treated in the work. Diagrams and tables have been used where necessary to enhance your understanding. You are advised to spend good time to study the work and ensure that you attend tutorial sessions where you can ask questions and compare your knowledge with that of your classmates.

### **The Course Material**

You will be provided with the following materials:

A Course guide

Study Units.

In addition, the course comes with a list of recommended text books which are not compulsory for you to acquire or read, but are essential to give you more insight into the various topics discussed.

### **Study Units**

The course is divided into 15 units. The following are the study units contained in this course:

#### **Module 1**

Unit 1	The Principles, Aims and Scope
Unit 2	Elements of Climate and Weather I
Unit 3	Elements of Climate and Weather II
Unit 4	Dynamics of Earth's Atmosphere
Unit 5	Radiation and Heating of the Atmospheric System

#### **Module 2**

Unit 1	Atmospheric Moisture
Unit 2	The Dynamics of Pressure and Wind Systems
Unit 3	Condensation and the Precipitation Process
Unit 4	Seasonal Variations in Temperature Daylight, Radiation
Unit 5	Seasonal Variation in Rainfall and Evaporation

**Module 3**

Unit 1	Equipment and Maintenance of a Standard Meteorological Station
Unit 2	Measurement of Air Pressure, Wind Speed, Wind Direction, Radiation and Sunshine Duration.
Unit 3	Measurement of Evaporation and Evapotranspiration and the Maintenance of a Standard Meteorological Station
Unit 4	Climate and Agriculture in the Tropics I
Unit 5	Climate and Agriculture in the Tropics II

**Module 1**

In unit one you will be taken through the definition of weather and climate and the activities of man's influence on these two phenomena. You will also be taken through the meaning of climatology and how it differs from meteorology. In the next two units, you will be taken through the elements of weather and climate and their control factors. Temperature and solar radiation are focused in unit two while forms of precipitation and distribution of pressure and winds are discussed in unit three.

The dynamics of the earth's atmosphere constitute the major focus of unit four. You will be taken through the peculiarities of the atmospheric circulation systems including the general circulation and others.

The general principles involved in radiation and heating of the atmospheric system form the theme of unit five. You will be taken through the form and nature of solar radiation and how the atmosphere is heated up by terrestrial radiation.

**Module 2**

In unit one, you will be taken through the source of the moisture in the atmosphere. Also you will be introduced to the knowledge of the amount and distribution of atmospheric moisture. Unit two will introduce you to the dynamics of pressure and wind systems. You will also learn about the various belts of permanently low and high pressure and the global wind system.

The processes of condensation and precipitation will be introduced to you in unit three. You will also be taken through the formation and types of precipitation.



In unit four, you will be introduced to the seasonal variations in radiation, daylight and temperature. Again you will learn about the factors responsible for these variations, particularly from one latitude to the other.

Unit five again introduces you to seasonal variations as they affect evaporation and rainfall. You will also learn about the major factors controlling the climate of West Africa which is the Inter Tropical Discontinuity (ITD)

### **Module 3**

In unit one, you will learn about the categories of weather stations and the measurement of elements like rainfall, air temperature and humidity. You will be exposed to the instruments and procedures of measuring air pressure, wind speed, wind direction, radiation and sunshine duration in unit two.

In unit three, you will learn about evapotranspiration. Also you will be taken through how to maintain a standard meteorological station.

Unit four introduces you to the general effects of radiation, photo periodism, water and humidity on the growth of crops.

Unit five introduces you to the effects of temperature on crop growth. You will further learn about the relationship between agriculture and irrigation on one hand and agriculture and pests and diseases on the other. Finally, you will learn about the relationships between climate and livestock.

### **Text Books**

The following textbooks are recommended for further reading

Ayoade, J.O. (2004). *Introduction to Climatology for the Tropics*. Ibadan: Spectrum Books Limited.

Ayoade, J.O.(2002). *Introduction to Agro Climatology*. Ibadan: Vantage Publishers.

Donald Ahren C. (1994). *Meteorology Today. An Introduction to Weather, Climate and the Environment* (5<sup>th</sup> ed). U.S.A: West Publishing Company.

Ojo,O.et al (2001) *Fundamentals of Physical and Dynamic Climatology* Lagos:SEDEC Publishers.

## **Assessment**

There are two components of assessment for this course. They are the Tutor -Marked Assignment (TMA), and the end of course examination.

## **Tutor -Marked Assignments**

The TMA is the continuous assessment component of your course. It accounts for 30% of the total score. The TMAs will be given to you by your facilitator and you will return it after you have done the assignment.

## **End of Course Examination**

This examination concludes the assessment for the course. It constitutes 70% of the whole course. You will be informed of the time for the examination.

## **Summary**

This course intends to provide you with the knowledge of weather and climate as it affects agricultural production. By the end of this course you will be able to answer the following questions.

- What is weather and climate and how do they affect the activities of man?
- Discuss the nature and scope of climatology.
- Discuss the radiation balance of the earth's atmospheric system.
- Describe and explain the general circulation of the atmosphere.
- Discuss the main theories of raindrop formation.
- Discuss the global distribution of pressure and wind.
- Describe the mode of formation of the convective, cyclonic and orographic precipitation.
- Comment about the importance of Inter Tropical Discontinuity.
- Describe the features of a standard meteorological station.
- Discuss the important steps to be adopted in the maintenance of meteorological stations.
- Explain the influence of solar radiation on crop growth and development.
- Explain the influences of temperature on crop production.

We wish you success in this course and hope that you will have a better understanding of the agro climatic phenomena in your environment.

Best of luck.