COURSE CODE: **CSC 201**
COURSE TITLE: **Computer Programming**
NUMBER OF Units: **3 Units**

Course Duration: Three hours per week

COURSE DETAILS:
Course Coordinator: Dr. (Mrs.) O. R. Vincent
NCE, B.Sc., M.Sc., PhD
Email: vincent.rebecca@gmail.com
Office Location: Room B201, COLNAS
Consultation hours: 12-2pm, Wednesdays & Fridays
Lecture Note developed by: The Department of Computer Science, University of Agriculture, Abeokuta
Head of Department: Dr. A. T. Akinwale

Course Content: History of computer, general structure of a computer system; types, classification and characteristics of a computer system and environmental conditions. Interval representation of data, character representation, concept of data, record file, basic models of file processing and their advantages, problem slog, flow charts, algorithm, symbolic, names subscripts, expression and control statements, computer structures and machine language, introduction to computer programming with special emphsis o BASIC and FORTRAN programming languages, computer application.

Course Description: The course is designed to introduce students in all departments to Computer Science, and enable them view it as a tool of data processing and give them basic knowledge of computer programming. The course also introduces the history and general structure of computer system with their types, explains the classification and characteristics of a computer system stating out the benefits of a personal computer to the society as a whole. It also emphasis character representation and demonstrate sample program using FORTRAN programming language.

Course Justification:
The need to use the Computer grows every year, every field of study employs computer system as an instrument. The theoretical and practical knowledge acquired from this course will give the students a foundation from which they can appreciate the relevant and the interrelationships of future courses in the field and to enable students from other disciplines relate to the technical society in which they live.

Course Objectives:
The general objective of the course as an integral part of the Barchelor Degree in University of agriculture, Abeokuta, is to make all the users have basic knowledge of Computer science as a tool of data processing and file management.

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

- Explain the history and the general features of a computer system
- Classify computers to their different categories.
- describe the concept of data management and the basic model of file processing with their advantages.
- Identify program flowchart, algorithm and symbolic names;
- Describe the concept of program expressions and control statements, computer structure and machine language.
- Identify FORTRAN as a computer programming language, its data type,expression and statements.
- Describe the concept of internet, resourses on the internet and intenet applications.

Course Requirements:
This is a compulsory course for all students in the University. In view of this, students are expected to participate in all the course activities and have minimum of 75% attendance to be able to write the final examination.

Reading List:
1. Randell, B. *The origins of Digitaln Computers.* New York: Springer-Verlag, 1973
2. Tavani, H. T. Ethics and Technology: *Ethical Issues in an Age of Information and Communication Technology.* New York: Wiley, 2004.
3. Halsal, F. *Computer networking and Internet*, Boston, MA: Addison-Wesley, 2005
4. Aho, A. V., J. E. Hopcroft, and J. D. Ullman. *The design and analysis of computer algorithms.* Boston: Addison-Wesley, 2007.
5. Metcalf, M., and J. Reid. *Fortran 90/95 explained,* 2nd ed. Oxford, England: Oxford University Press, 1999.
6. Noonan, R., and A. Tucker. *Programming Languages.* Principles and paradigms. Burr Ridge, IL: McGraw-Hill, 2002.

LECTURE CONTENT

Week 1:

- **Definitions, History, Classification, Types and Benefits of Computer to the society.**
- **Characteristics and Environmental conditions**
- **Hardwares and Computer System Devices**

Objective: The student should be able to explain the history and the general structures of a computer system, identifying the types of the computer system, classifying computer according to their types; stating out their characteristics and the environmental conditions attached to each. Also identify the hardware and the computer system devices.

Description: The course outline will be introduced with emphasis on the objectives

and delivery strategies, stating out the benefits of computer to the society and the expectation for the study of the programme.

Study Questions:

11. Define a computer
2. What are the characteristics of a mainframe computer?
3. What are the characteristics of a Laptop computer?
4. What are the particular benefits of PCs when used in an Information system?
5. What are the four general types of Computers?
6. How is data normally distinguished from information?
7. Why is the current trend toward increased dependence on computers not reversible in modern society?
8. In what way are computers being used to improve our "quality of life"
9. What is the "defining characteristic" of a Computer?
10. What are your expectations from the course?

Reading List:

1. Randell, B. *The origins of Digitaln Computers.* New York: Springer-Verlag, 1973
2. Tavani, H. T. Ethics and Technology: *Ethical Issues in an Age of Information and Communication Technology.* New York: Wiley, 2004.

Week 2:

- **Data and character representation**
- **Concepts of data, record and file**
- **Basic models of file processing and their advantages**
- **Softwares**
- **Logic gates and truth table**
- **Programming Languages**

Objective: The objective is for the student to be able to identify and explain the various ways of representing data/information in computer system, identify different types of character codes, define software and its types giving examples in each case. The concepts of logic gates and the truth table should be emphasized, so also the generations of the programming languages.

Description: Various ways of representing data/information in computer system will be discussed and the objectives for the course shall be well enumerated.

Study Questions

1. Outline the three ways of representing data in computer system
2. Convert 00110010 into octal
2. Convert 100110010 to hexadecimal
3. Convert $3BC_{16}$ to binary

4. What are the main functions of an operating system.
5. Give three computer applications for which the use of assembler language would be appropriate.
6. In question (5), characterise these application and draw any conclusions
7. What characteristics do assemblers and computers have in common?
8. Distinguish between system software and application software

Reading List:

1. Randell, B. *The origins of Digitaln Computers.* New York: Springer-Verlag, 1973
2. Tavani, H. T. Ethics and Technology: *Ethical Issues in an Age of Information and Communication Technology.* New York: Wiley, 2004.

Week 3:

- **Data Structure and Organisation**
- **Data types and File types**
- **File Organisation and Processing**
- **Symbolic names and Subscripts**
- **Computer Structures and machine language**

Objective: The objective of the week lecture is for the student to be able to identify the methods in which data are organised and structured, identify different types of file, itemized various activities that can be carried out on the record of a file.

Description: Characters, facts, records, files and databases form an organisation of data. The structure of the data is the composition of records into files for generating information. Various activities that can the carried out on the record of a file i.e the processing activities are sorting, merging, file maintenace, validation, referrencing, updating, searching, etc. The methods of organizing files on a magnetic tape should be identified and the three basic logical structure i.e sequencing, selection and repetition.

Study questions:

1. Enumerate six processing activities
2. List out 4 methods by which file can be organized on a magnetic disk.
3. Mention four types of file.

Reading List:

Shaffer, C. A. *Practical introduction to Data Structures and Algorithm* Analysis. 2nd ed. Upper Saddle River, NJ: Prentice Hall, 2001.

Week 4:

- **Programming – Principles of good programming**
- **Expression and control statement**

- **Program flowchart and algorithms**
- **Structured pseudocodes**
- **Decision tables**

Objective: The objective of the week lecture is for the students to be able to explain the princinples of good programmng style, identify different expressions and the use of the control statement, write simple algorithms and draw a simple flowchart of an operation; design a structured pseudocodes and construct decision tables.

Description: The rules for writing a good program should be clearly stated and all the objectives for the week should be strategically emphasis.

Study questions:

1. What are the rules for writing a good program?
2. Give examples of flowchart symbols
3. Name types of flowchart
4. What are the advantages and disadvantages of program flowchart?
5. Define the term Program and System Flowcharts
6. Mention and highlight examples of two widely used programs in an organisation.
7. Why is structured pseudo code better that simple algorithm?

Reading List:

Noonan, R., and A. Tucker. *Programming Languages.* Principles and paradigms. Burr Ridge, IL: McGraw-Hill, 2002.

Week 5:

- **Programming in FORTRAN - Introduction**
- **Fortran data types and expression**
- **Operators and functions**
- **Fortran statements:**
  - **I/o statement,**
  - **Control statement (if, for, while statements)**
  - **Do statement, etc.**
- **Repetitive structures**

Objective: The objective of the week lecture is for the studenst to be able to write a good program in Fortran, clearly define the Fortran data type with a well stated expression, taking into cognisance the Fortran Statements and the recursive structures. Repetitive structures provide an alternative to the loop paradigm for implementing the repetition of activities.

Description: Computer programs, regardless of the language in which they are written, are designed to manipulate data of some kinds. CONSTANTS and VARIABLES, and their terms are used in FORTRAN in almost the same sense as in mathematics. Repetitive

structures provide an alternative to the loop paradigm for implementing the repetition of activities.

Study questions:

1. Detect error in this READ statement READ*, A, B, C, D.
2. The Statement below can be classified as either Formatted or Unformatted write statement?

```
WRITE(*,30) A

30 FORMAT(1X, F10.2)
```

3. List the three types of FORTRAN constant types
4. What are the rules for forming integer and real constants
5. Fortran language are written in in lower case (true/false)
6. What is a subroutine?
7. What is an array?
8. Give examples of formatted READ statement

Reading List:

Metcalf, M., and J. Reid. *Fortran 90/95 explained,* 2nd ed. Oxford, England: Oxford University Press, 1999.

Week 6:

- **Problem solving using Fortran commands**
- **Demonstration of simple Fortran output**

Objective: The objective of the week lecture is for the student to be able to write a simple Fortran programs.
Description: A simple Fortran output should be printed for assessment.

Study questions:

1. Write a Fortran program to achieve multiplication table
2. Write a Fortran program to construct a pascal triangle.

Reading List:

Metcalf, M., and J. Reid. *Fortran 90/95 explained,* 2nd ed. Oxford, England: Oxford University Press, 1999.

Week 7: Information and Communication Technology

- **Data transmission and transmission media**
- **Data transmission equipments**
- **Office and mobile communications**
- **Telex, e-mail, etc**

Objective: The objective of the week lecture is for the student to be able to explain the concept of information and communication taking into cognisance the procedural objectives.

Description: Means of communication between subsystem are Electronic Communication, Paper-based Communication and Oral Communication. The merit and demerit of each should be outlined. Data transmission can either be BIT SERIAL or BIT PARALLEL transmission, The data transmission equipment used to connect terminals to a computer consist of MODEMS and MULTIPLEXORS.

Study questions:

1. A data communication link between computer component is called ……
2. Changing data to a form that is unintelligible unless a special key is known is ……
3. Transferring data from a local computer to a result computer is called ……..
4. What is the different between a digital signal and an analog signal?
5. What does a modem do?
6. Distinguish between band rate and baud rate
7. What are the advantages of synchronous transmission over asynchronous
8. What are the purposes of protocol
9. What is the importance of E-mail to Nigeria society?

Reading List:

1. Halsal, F. *Computer networking and Internet*, Boston, MA: Addison-Wesley, 2005
2. Tavani, H. T. Ethics and Technology: *Ethical Issues in an Age of Information and Communication Technology.* New York: Wiley, 2004.

Week 8: Internet

- **Internet architecture**
- **Network media, wireless media**
- **Internet Protocols and topology**
- **Internet application, world wide web(www)**

Objective: The objective of the week lecture is for the student to be able to define Internet and network. Briefly describe different kinds of network available, indicating their differences, outline the network media. S0 also the organization of network protocols and topology should be emphasized i.e

Description:
An Interconnected collection of autonomous processors. A Network is a group of two or more computers connected to each other by a cable, over telephone lines or through wireless communication. When you are connected to a network, you can share resources on your computer such as documents, programs, printers, modems and use other resources from other computer.

Study questions:
1. What is internet?
2. Explain the following: LAN, WAN, Bus topology, Modem , bridge

Reading List:
Halsal, F. *Computer networking and Internet*, Boston, MA: Addison-Wesley, 2005

Week 9: Security and controls

Objective: The objective of the week lecture is for the student to be able to explain the concept of security and its control. Enumerating different forms of attack via network connection.

Description:
The protection of data from accidental or deliberate threats which might cause unauthorized invitation, disclosure or non-availability of services. The concept of PRIVACY is closely related to the idea of confidentially, or the need to prevent unauthorized disclosure of data; Privacy is the right of the individual to control the use of information about him or her including information on financial status, health and life style.

Study questions:
1. Define the term “internet security’?
2. What are the way in which malware gains access to a computer system.

Reading List:
Bishop, M. Introduction to Computer security. Boston, MA: Addison-Wesley, 2005.

Week 10: Revisions and Examinations

Objective: The objective of the week lecture is for the student to be able to revise all they have been taught so far.

Description:
All the objectives for the course should be seriously overview