



LEAD CITY UNIVERSITY, IBADAN
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONIC
ENGINEERING
SEMESTER/SESSION: 1ST SEMESTER, 2024/2025

Course Particulars

Course Code: GET 200
Course Title: Computing and Software Engineering
Course Units: 3
Course Status: Core

Lecturer's Details

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Areas of Specialization

Systems analysis and design, modeling, simulation, optimization and control. Sensors and transducers for instrumentation. Artificial Intelligent & Machine Learning and Expert System.

Course Synopsis

Introduction to computers and computing; computer organisation – data processing, memory, registers and addressing schemes; Boolean algebra; floating-point arithmetic; representation of non-numeric information; problem-solving and algorithm development; coding (solution design using flowcharts and pseudo codes). Data models and data structures; computer software and operating system; computer operators and operators precedence; components of computer programs; introduction to object oriented, structured and visual programming; use of MATLAB in engineering applications. ICT fundamentals, Internet of Things (IoT). Elements of software engineering.

The course objectives are to:

- Explain the fundamentals of Computer and Computing components.
- Explain the computer software design tools
- Introduce the concept of Modular programming
- Describe software development techniques.
- Explain internet of Things (IoT) technology
- Explain Engineering Software concept
- Apply programming skills to software development.

Course Learning Outcomes (CLOs)

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

1. describe and apply computing, software engineering knowledge, best practices, and standards appropriate for complex engineering software systems;
2. develop competence in designing, evaluating, and adapting software processes and software development tools to meet the needs of an advanced development project through practical object-oriented programming exposure taught in concrete terms with a specific modern language – preferable selected from Python, Java or C++;
3. use widely available libraries to prepare them for machine learning, graphics and design simulations;
4. develop skills in eliciting user needs and designing an effective software solution;
5. recognise human, security, social, and entrepreneurial issues and responsibilities relevant to engineering software and the digitalisation of services; and
6. acquire capabilities that can further be developed to make them productively employable by means of short Internet courses in specific areas.

Lecture Delivery Method

- Lecture with interactive sessions
- Tutorial exercises

LECTURE PLAN

Course Modules

Module 1: Introduction to Computer and Computing components

Module 2: Computer Program, Algorithm and Flowchart

Module 3: Modern programming concept

Module 4: Network Security Fundamentals

Course Outline

Module 1: Introduction to Computer and Computing components

Number of Lecture Hours: 12

Week	Lecture Topic	Contents	Learning Objectives
1	Introduction and Course Overview	Course outlines, delivery methods, assessments, course materials and recommended text books	Discuss the general overview of the course, as well as rules and regulations requisite for successful achievement of the course objectives.
2	Introduction to Computer and Computing software	Definition of Computer and Computing, computer's hardware organization, differentiate between CRT and solid state electronics	Explain Computer system as well as technology employed.

3	Computer Hardware components	CPU, main memory, secondary memory, register, display unit, main/mother board, CMOS battery	Identified and understand the function of various computer hardware components.
4	Introduction to Computer Software and Processors	System Software, Application software, Intel's Pentium processor	Understand the concept of system and application software with the function of processor.

Module 2: Computer Program, Algorithm and Flowchart

Number of Lecture Hours: 9

Week	Lecture Topic	Contents	Learning Objectives
5	Introduction to Computer Program	Computer Program, features of a good program.	Understand the concepts Computer Programming
6	Algorithm	Define algorithm, feature of an Algorithm, methods of expressing algorithm, simple algorithm, detail algorithm.	Understand how to write a good pseudocode
7	Flowchart	Define flowchart, Flowchart Symbols, simple flowchart, detailed flow chat.	Understand how to draw flowchart
8	Revision	Tutorial exercises	Continuous Assessment

Module 3: Modern programming concept

Number of Lecture Hours: 9

Week	Lecture Topic	Contents	Learning Objectives
9	Modular Programming with Levels of Programming Languages	Define Modular Programming, advantage of Modular Programming, Machine Language, Assembly Language, High Level Language.	Explain the concept of Modular Programming and Levels of Programming Languages
10	Introduction to High level programming (Java)	Brief history of java, features of java, JDK and JVM, Simple program	Explain why java is a good high level language.
11	Variables and the Primitive data Types	Variable, Rules of naming variables, reserved words, compound names, Non-compound names, primitive types: byte, short, int, long, float, double, char, and boolean	Understand the concept of variables and data type.

Module 4: Network Security Fundamentals

Number of Lecture Hours: 9

Week	Lecture Topic	Contents	Learning Objectives
12	Input, Output and expressions	Data input and output, Arithmetic Operators: +, -, *, and /, type conversion, Increment and Decrement operators, relational operators, Boolean Operators, Assignment Operators and Type-Casts, Type Conversion of Strings	Explain and apply network security concepts.
13-14	Program control	Blocks, Basic While Loop, Basic If Statement, while Statement, do..while Statement, break and continue, For Statement, Nested for Loops, Dangling else Problem, switch Statement, Exceptions and try..catch	Explain remote network access for private networks
14	GUI/ OOP Programming	Applet, GUI, computer animation, object, class, methods, inheritance, Interfaces, polymorphism e.t.c	Explain and apply the concept of GUI and OOP programming
15	IoT and Software Engineering	Define IoT, Characteristics of IoT, Baseline Technologies of IoT, Applications Of IoT, Challenges of IoT, defines software engineering, Need of Software Engineering, software life cycle models	Understand the basics of IoT technology and Software Engineering
16	Revision	Tutorial exercises	

Grading System

This course will be graded as follows:

Attendance:	10%
CA/Assignments:	30%
Examination:	60%
Total:	100%

References

Hobart, D. J. E., & Colleges, W. S. (2006). *Introduction to programming using Java* (5th ed., Vol. 1) [Electronics]. Eck.

Morelli, R., & Walde, R. (2024). *Introduction to Java* (1st ed., Vol. 1) [Electronic]. Trinity College.

Tse, T. H. (2004). Computing Curriculum— Software Engineering: Its Impacts on Professional Software Engineering education. In *Proceedings of the 28th Annual International Computer Software and Applications Conference (COMPSAC'04)*. IEEE Xplore.
<https://doi.org/10.1109/CMPSAC.2004.1342824>

GET 200 Tutorial Questions

Question 1

15 Marks

- a) Define Computer System.
- b) With the aid of a well labelled diagram, describe computer's hardware organization.
- c) Explain Cathode ray tube (CRT) technology.
- d) Write a Java program to find the square root of a number using the Babylonian method.

Question 2

15 Marks

- a) With the aid of suitable schematic diagram explain the function of the following computer hardware components (i) CPU, (ii) main memory (RAM), (iii) hard disk, (iv) display unit, (v) main/mother board, (vi) CMOS battery, (vii) Keyboard (viii) Mouse.
- b) Write a pseudocode to get a number from the user and print whether it is positive or negative.
- c) Write a Java program to get a number from the user and print whether it is positive or negative.

Question 3

15 Marks

- a) Define software.
- b) Differentiate between system software and application software.
- c) Write a Java program that takes three numbers from the user and prints the greatest number.

Question 4

15 Marks

- a) What is Computer program.
- b) Highlight features of a good program.
- c) Explain Machine Language, Assembly Language and High Level Language.

- d) Write a Java program to display the pattern like a right angle triangle with a number as shown below.

```
1
12
123
1234
12345
123456
1234567
12345678
123456789
12345678910
```

Question 5

15 Marks

- Define algorithm.
- Highlight the feature of an Algorithm
- Write a Java program to display the pattern like a diamond.

```
      *
     **
    ***
   ****
  *****
 *****
*****
 *****
  *****
   ****
    ***
     **
      *
```

Question 6

15 Marks

- Define flowchart
- In tabular form write name, usage and draw the shapes of Flowchart Symbols.
- Write a Java program that accepts three numbers and prints "All numbers are equal" if all three numbers are equal, "All numbers are different" if all three numbers are different and "Neither all are equal or different" otherwise.

Question 7

15 Marks

- Define Modular Programming.
- State and explain the advantages of Modular Programming.

- c) All 200 level in the Faculty of Engineering and Technology were asked to register for **ID Card** at the senate building. Develop an application to inform the students and print “YOU ARE WELCOME PLEASE REGISTER” if the student is in 200 level, or print “YOU ARE NOT IN 200 LEVEL” otherwise.

Question 8

15 Marks

- a) Describe Variable as it relates to computer programming.
- b) State rules of naming variables in Java,
- c) List 14 reserved words in Java. compound names.
- d) Write a Java program to get whole and fractional parts from a double value

Question 9

15 Marks

- a) With example explain the concept of Compound and Non-compound names.
- b) List and describe briefly the primitive types available in Java.
- c) Describe Increment operators, Decrement operators and relational operators,

Question 10

15 Marks

- a) What is a block statement? How are block statements used in Java programs.
- b) What is the main difference between a while loop and a do ...while loop?
- c) Write a for loop that will print out all the multiples of 3 from 3 to 36, that is: 3 6 9 12 15 18 21 24 27 30 33 36.

Question 11

15 Marks

- a) Fill in the following main() routine so that it will ask the user to enter an integer, read the user's response, and tell the user whether the number entered is even or odd. (You can use `TextIO.getInt()` to read the integer. Recall that an integer n is even if $n \% 2 == 0$.)
`public static void main(String[] args) { // Fill in the body of this subroutine! }`
- b) Draw flowchart to solve the problem describe in 11a.
- c) Explain the concept of JDK and JVM

Question 12

15 Marks

- a) Show the exact output that would be produced by the following main() routine:
`public static void main(String[] args) {
 int N;
 N = 1;
 while (N <= 32) {
 N = 2 * N;`

```

        System.out.println(N);
    }
}

```

- b) Show the exact output produced by the following main() routine:

```

public static void main(String[] args) {
    int x,y;
    x = 5;
    y = 1;
    while (x > 0) {
        x = x - 1;
        y = y * x;
        System.out.println(y);
    }
}

```

- c) Explain the Baseline Technologies of IoT

Question 13

15 Marks

- Write a program that asks the user's name, and then greets the user by name. Before outputting the user's name, convert it to upper case letters. For example, if the user's name is Fred, then the program should respond "Hello, FRED, nice to meet you!"
- Write a pseudocode to design the computational problem in 13a.
- Describe methods of expressing algorithm.

Question 14

15 Marks

- Supposed as an Engineer, you are being contacted by INEC to develop an application for voting in Nigeria. Write a Java program to solve the problem.
- Draw a flowchart of the problem solved in 14a.
- Describe Intel's Pentium processor.

Question 15

15 Marks

- Define IoT.
- State the Characteristics of IoT.
- Highlight the Applications Of IoT. Challenges of IoT.
- Write a Java program to convert a Roman number to an integer number

Question 16

15 Marks

- Defines software engineering.
- Explain why we need of Software Engineering.
- Write a Java program to test if a double number is an integer

Question 17

15 Marks

- a) Develop a java application to print out the above figure and inform the user about its dimension.
- b) Write a Java program to calculate the root of a quadratic equation using the general quadratic equation and taking into consideration the real and equal root and imaginary root.
- c) Describe some software life cycle models