(CS-107) - Introduction to Computing

Course Outline:

Theory:

1. **Introduction**
    1. Applications of Computers
    2. Classification of Computers
    3. Advantages and Disadvantages of Computers.
    4. Basic Components of a Computing Machine.
    5. Input and Output Devices
    6. Mass Storage Devices
    7. Ports, Buses and Expansion slots.
    8. Computer Networking Environment
2. **Data Storage**
    1. Data organization.
    2. Data representation in Computers.
    3. Physical and Logical Storage.
    4. Magnetic Storage Devices viz. RAM, ROM, Secondary Storage, Cache.
    5. Optical Storage Devices.
3. **Data Processing**
    1. Data Structures.
    2. Flow Charts.
    3. Process Flow Diagrams
4. **System and Application Programming**
    1. Basics of Operating Systems.
    2. Desktop and Network Operating Systems, Application softwares.
5. **Computer Programming**
    1. Introduction to High Level and Low Level Programming Languages.
    2. Process of Compilation and Interpretation.
    3. Data Types and Declaration.
    4. Header file and Linkage.
    5. Preprocessor Directives.
    6. Variables and Constants.
    7. Basic library functions.
    8. Input and Output Statements.
    9. Termination, Remarks.
    10. Control structures
    11. Repetition and loops.
    12. Arrays and String Operations
    13. Data Filling
    14. Using Graphics Libraries in Python/C++.
6. **Defining an Engineering Problem**
    1. Transforming Data in to Information.
    2. Using Computers to Solve an Engineering Problem.
7. **Object Oriented Programming Basics**
    1. Understanding core concepts
    2. Classes, Implementation of class and Objects.
    3. Objects as physical objects.
    4. Encapsulation.
    5. Directives
    6. Functions and Overloaded Functions
    7. Reference arguments
    8. Abstraction

9. Polymorphism
10. Object as data types constructor
11. Object as function arguments.

8. **User defined data types, Arrays and String Arrays fundamentals**
    1. User defined data types.
    2. Arrays of objects.
    3. Arrays as class Member Data
    4. Strings and String arrays.
9. **Inheritance**
    1. Concept of inheritance.
    2. Derived classes and Base classes.
    3. Derived Class Constructors.
    4. Member Functions
    5. Class hierarchies.
    6. Public and Private inheritance.
10. **Errors and Exceptions**
    1. A systematic, object-oriented approach to handling errors generated by python classes.
    2. Dealing example errors at runtime using Exceptions.
    3. Understanding Exceptional circumstance of Running out of memory
    4. Understanding Exceptional circumstance of Problems opening a file.
11. **Semester Project- Group Activity**

Practical:

1. Working with Windows 8/10 and DOS.
2. Basic Computer Hardware Awareness and Troubleshooting
3. To begin Programming in Python/C++.
4. Preparing your PC for Python/C++.
5. Understanding Shell and IDLE in Python and/or C++ IDE.
6. Making small programs, do compilation, execution and debugging of programs.
7. Implementation of simple control structures.
8. Using Loops
9. Implementation of functions
10. Using user input and presenting output.
11. Arrays, multidimensional arrays
12. Working with strings, string functions.
13. Data Filling in Python/C++.
14. Using Graphics Libraries in Python/C++.
15. Open Ended Lab I
16. Open Ended Lab II

Teaching Methodology:

- Lecturing, Student Engagement
- Quizzes and Assignments, uploading suggested resources on course website.
- Semester Project
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Suggested Assessment:

Theory (100%)

- Sessional (20%)

- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

Laboratory (100%)

Text and Reference Books:

1. Brian Williams and Stacey Sawyer, Using Information Technology, Latest Edition, McGraw-Hill, ISBN: 0072260718
2. William Stallings, Computer Organization and Architecture: Designing for Performance, Latest Edition , Prentice Hall, ISBN: 0131856448, ISBN-13: 9780131856448
3. Allen Downey; Think Python: How to Think Like a Computer Scientist; Green Tea Press Needham, Massachusetts.
4. David Beazley and Brian K. Jones, "PYTHON Cookbook"; O'Reilly Atlas.
