**Course: CSE110 Object-Oriented Programming**

**Credits and Teaching Scheme**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Theory | Laboratory | Total |
| Credits | 3 | 1.5 | 4.5 |
| Contact Hours | 3 Hours/Week for 13 Weeks + Final Exam in the 14th Week | 3 Hours/Week for 13 Weeks | 6 Hours/Week for 13 Weeks + Final Exam in the 14th Week |

**Prerequisite**

CSE103 Structured Programming

**Course Objective**

This course presents a conceptual and practical introduction to object-oriented programming (OOP). The course will cover general principles of programming in object-oriented frameworks to enhance transferable skills, such as programming, designing, and problem-solving skills. This course introduces object-oriented concepts and develops OOP programs which provides solutions to real-world object-oriented problems. Java is primarily chosen as the programming language in this course. Knowledge of this course will be needed as prerequisite knowledge for CSE207 Data Structures.

**Knowledge Profile**

K2: Conceptually-based mathematics, numerical analysis, statistics, and formal aspects of computer and information science

**Learning Domains**

Cognitive – C2: Understanding, C3: Applying

Psychomotor - P2: Manipulation, P3: Precision

Affective - A2: Responding

**Program Outcomes (POs)**

PO1: Engineering Knowledge

**Complex Engineering Problem Solution**

EP1: Depth of knowledge required

EP2: Range of conflicting requirements

**Complex Engineering Activities**

None

**Course Outcomes (COs) with Mappings**

After completion of this course students will be able to:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CO** | **CO Description** | **PO** | **Learning Domains** | **Knowledge Profile** | **Complex Engineering Problem Solving/ Engineering Activities** |
| CO1 | **Understand** and **apply** the basics of elementary programming in the target languageand concepts related to the definition, creation and usage of classes and objects for writing object-oriented programs. | PO1 | C2, C3 | K2 | - |
| CO2 | **Understand** the advanced principles of OOP such as encapsulation, inheritance, polymorphism, abstract class and interface for implementing object-oriented programs. | PO1 | C2 | K2 | - |
| CO3 | **Apply** OOP concepts and constructs to design and implement complex object-oriented applications. | PO1 | C3 | K2 | - |
| CO4 | **Demonstrate** skills and **write** reports to design, build and test realistic, complex object-oriented application.  **Use** appropriate language constructs; **perform** and **demonstrate** skills; and **write** report for developing programs for solving complex problems. | PO1 | C3  P2, P3  A2 | K2 | - |

**Course Topics, Teaching-Learning Method, and Assessment Scheme**

| **Course Topic** | **Teaching-Learning Method** | **CO** | **Mark of Cognitive Learning Levels** | | **CO Mark** | **Exam**  **(Mark)** |
| --- | --- | --- | --- | --- | --- | --- |
| C2 | C3 |
| Principles of Object-Oriented Programming and Basics of Elementary Programming in target language (conditional branching, looping, methods and arrays) | Lecture, Class Discussion, Discussion outside class with Instructor/TA | CO1 | 5 | 5 | 10 | **Midterm Exam I**  **(16)** |
| Introduction to Classes and Objects (Classes, Objects, Instance variables and instance methods, Constructors) | Do | CO1 | 6 |  | 6 |
| Inheritance and Polymorphism in OOP (super class, sub class, multiple-level inheritance, late binding) | Do | CO2 | 4 |  | 4 | **Midterm Exam II (16)** |
| CO3 |  | 4 | 4 |
| Abstract Class and Interfaces (differences, applicability and implementation) | Do | CO2 | 4 |  | 4 |
| CO3 |  | 4 | 4 |
| Exception Handling in OOP and  File handling using Text and Binary I/O | Do | CO3 |  | 10 | 10 | **Final Exam**  **(20)** |
| Implementation of Generics and GUI, Multi-threaded Programming, JDBC and other advanced topics | Do | CO3 |  | 10 | 10 |

**Laboratory Experiments and Assessment Scheme**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Experiment** | **Teaching-Learning Method** | **CO** | **Marks of Cognitive Level** | **Mark of Psychomotor Level** | | **Mark of Affective Level** | **CO Mark** |
| C3 | P2 | P3 | A2 |  |
| Java Basics of Elementary Programming, Conditional Statements | Lab Experiment and Result Analysis and Discussion with Instructor, Post-Lab Report | CO4 |  |  |  |  |  |
| Looping, Nested Looping, Arrays | Do | CO4 |  |  |  |  |  |
| Java Methods and library functions | Do | CO4 |  |  |  |  |  |
| Designing and Implementing simple Classes and Objects, Arrays of Objects etc. | Do | CO4 |  |  |  |  |  |
| Implementing associations of Classes | Do | CO4 |  |  |  |  |  |
| Designing and Implementing Inheritance and Polymorphism | Do | CO4 |  |  |  |  |  |
| Designing and Implementing Abstract Class and Interfaces | Do | CO4 |  |  |  |  |  |
| Understanding and Implementing Exceptions and File management | Do | CO4 |  |  |  |  |  |
| Lab Exercises  (Total) |  | CO4 | 10 | 2 | 1 | 2 | 15 |
| Lab Exam | Individual Exam | CO4 | 5 | 1 | 1 | 0 | 7 |
| **Total** |  |  | **15** | **3** | **2** | **2** | **22.0** |

**Mini Projects**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Mini Project** | **Teaching-Learning Method** | **CO** | **Mark of Cognitive Learning Level** | **Mark of Psychomotor Learning Levels** | | **Mark of Affective Learning Level** | **CO Mark** |
| **C3** | **P2** | **P3** | **A2** |
| Lab-based Mini Project including Report and Presentation | Group-based moderately complex digital circuit design project with report writing and oral/poster presentation | CO4 | **7** | **1** | **1** | **2** | **11** |

**Overall Assessment Scheme**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Assessment Area** | **CO** | | | | **Other** | **PO Marks** |
| **CO1** | **CO2** | **CO3** | **CO4** | **PO1** |
| Class Participation |  |  |  |  | 5 |  |
| Class Test/Quiz |  |  |  |  | 10 |  |
| Midterm-I Exam | 16 | 0 | 0 | 0 |  | 16 |
| Midterm-II Exam | 0 | 8 | 8 | 0 |  | 16 |
| Final Exam | 0 | 0 | 20 | 0 |  | 20 |
| Laboratory Performance and Lab Exam | 0 | 0 | 0 | 22 |  | 22 |
| Mini Project | 0 | 0 | 0 | 11 |  | 11 |
| **Total** | **16** | **8** | **28** | **33** | **15** | **85** |