SENG 116 – OBJECT ORIENTED PROGRAMMING

Course Code	Course Name			Semester	
SENG 116	Object Oriented Programming			Fall ☐ Spring ☒ Summer ☐	
Hours				Credit	ECTS
Theory	Practice	Lab		3	4
3	-	-			

Course Details	
Department	Computer Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☒ Elective ☐
Course Objectives	The course aims to provide students with a comprehensive understanding of the fundamental concepts of object-oriented programming, including encapsulation, inheritance, polymorphism, and abstraction. Students will learn to design and implement classes and objects that effectively model real-world entities and relationships. The course emphasizes the importance of code reusability through inheritance and composition, promoting efficient software development practices. Students will apply object-oriented techniques to solve complex programming problems, focusing on algorithm design and data structures. Debugging and testing skills will be developed to ensure the reliability and correctness of object-oriented programs. Students will also analyze and implement OOP concepts in real-world applications using C# programming language.
Course Content	Introduction to Visual Studio and Visual Programming, Introduction to C# App Programming, Introduction to Classes, Objects, Methods and strings, Methods, A Deeper Look, Introduction to LINQ and the List Collection, Classes and Objects: A Deeper Look, Object-Oriented Programming: Inheritance, OOP, Polymorphism and Interfaces
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☐ Discussion ☒
Prerequisites/ Corequisites	
Work Placement(s)	
Textbook/References/Materials	

- Visual C# How to Program, P. Deitel, H. Deitel, Global Ed. (6th Ed.), Pearson Education Ltd.

Course Category				
Mathematics and Basic Sciences	☐		Education	☐
Engineering	☒		Science	☐
Engineering Design	☐		Health	☐
Social Sciences	☐		Profession	☐

Weekly Schedule		
No	**Topics**	**Materials/Notes**
1	**Introduction to Visual Studio and Visual Programming:** Overview of the Visual Studio IDE, Menu Bar and Toolbar, Navigating the Visual Studio IDE, Help Menu and Context-Sensitive Help, Visual Programming: Creating a Simple App that Displays Text and an Image (Deitel, Ch-2)	Creating simple GUI's
2	**Introduction to C# App Programming:** Simple App: Displaying a Line of Text, Creating a Simple App in Visual Studio, Modifying Your Simple C# App, String Interpolation, Another C# App: Adding Integers, Memory Concepts, Arithmetic, Decision Making: Equality and Relational Operators (Deitel, Ch-3)	Creating C# Apps
3	**Introduction to Classes, Objects, Methods and `string`s:** Test-Driving an `Account` Class, `Account` Class with an Instance Variable and *Set* and *Get* Methods, Creating, Compiling and Running a Visual C# Project with Two Classes, Software Engineering with *Set* and *Get* Method (Deitel, Ch-4)	
4	Account Class with a Property Rather Than Set and Get Methods, Auto-Implemented Properties, Account Class: Initializing Objects with Constructors, Account Class with a Balance; Processing Monetary Amounts (Deitel, Ch-4)	Computerization of Health Records
5	**Methods: A Deeper Look:** Packaging Code in C#, `static` Methods, `static` Variables and Class `Math`, Methods with Multiple Parameters, Notes on Using Methods, Argument Promotion and Casting, The .NET Framework Class Library, Case Study: Random-Number Generation, (Deitel, Ch-7)	
6	Case Study: A Game of Chance; Introducing Enumerations, Scope of Declarations, Method-Call Stack and Activation Records, Method Overloading, Optional Parameters, Named Parameters, C# 6 Expression-Bodied Methods and Properties, Recursion, Value Types vs. Reference Types, Passing Arguments By Value and By Reference (Deitel, Ch-7)	Computer-Assisted Instruction: Reducing Student Fatigue
7	**Midterm Exam**	
8	**Introduction to LINQ and the List Collection:** Querying an Array of `int` Values Using LINQ, Querying an Array of `Employee` Objects Using LINQ (Deitel, Ch-9)	Sorting Pets Names by Length

9	Introduction to Collections, Querying the Generic `List` Collection Using LINQ (Deitel, Ch-9)	
10	**Classes and Objects: A Deeper Look:** `Time` Class Case Study; Throwing Exceptions, Controlling Access to Members, Referring to the Current Object's Members with the `this` Reference, Time Class Case Study: Overloaded Constructors, Default and Parameterless Constructors (Deitel, Ch-10)	Rational Numbers
11	Composition, Garbage Collection and Destructors, `static` Class Members, `readonly` Instance Variables, **`Class View`** and **`Object Browser`**, Object Initializers, Operator Overloading; Introducing struct, `Time` Class Case Study: Extension Methods (Deitel, Ch-10)	
12	**Object-Oriented Programming: Inheritance:** Base Classes and Derived Classes, `protected` Members, Relationship between Base Classes and Derived Classes, Constructors in Derived Classes, Software Engineering with Inheritance, Class `object` (Deitel, Ch-11)	Account Inheritance Hierarchy
13	**OOP: Polymorphism and Interfaces:** Polymorphism Examples, Demonstrating Polymorphic Behavior, Abstract Classes and Methods (Deitel, Ch-12)	
14	Case Study: Payroll System Using Polymorphism, `sealed` Methods and Classes, Case Study: Creating and Using Interfaces (Deitel, Ch-12)	CarbonFootprint Interface: Polymorphism
15	**Final Exam**	

Assessment Methods and Criteria		
In-term studies	**Quantity**	**Percentage**
Attendance	12	6
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework	2	14
Presentation / Seminar		
Project		
Report		
Seminar		
Midterm Exam	1	30
Final Exam	1	50
	Total	**100%**
Contribution of Midterm Studies to Success Grade		**50%**
Contribution of End of Semester Studies to Success Grade		**50%**
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	14	3	42
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time	14	2	28
Quiz/Studio/Criticize			
Homework	2	5	10
Presentation / Seminar			
Project			
Report			
Midterm Exam and Preparation for Midterm	1	10	10
Final Exam and Preparation for Final Exam	1	10	10
Total Workload			100
Total Workload / 25			4
ECTS Credit			4

Course Learning Outcomes	
No	**Outcome**
L1	Understanding OOP principles
L2	Designing classes and objects
L3	Ability to create reusable code through inheritance and composition
L4	Ability to apply object-oriented techniques to solve complex programming problems
L5	Developing skills in debugging and testing object-oriented programs

Program Competencies	
No	**Outcome**
P1	**Engineering Knowledge**: Knowledge in mathematics, natural sciences, fundamental engineering, computational methods, and discipline-specific engineering topics; the ability to apply this knowledge in solving complex engineering problems.
P2	**Problem Analysis**: The ability to identify, formulate, and analyze complex engineering problems using fundamental sciences, mathematics, and engineering knowledge while considering the relevant UN Sustainable Development Goals (SDGs)**.**
P3	**Engineering Design**: The ability to design creative solutions for complex engineering problems; the capability to design complex systems, processes, devices, or products in a way that meets current and future needs while considering realistic constraints and conditions.
P4	**Use of Techniques and Tools**: The ability to select and use appropriate techniques, resources, and modern engineering and computing tools—including simulation and modeling—for analyzing and solving complex engineering problems while being aware of their limitations.
P5	**Research and Investigation**: The ability to conduct research by performing literature reviews, designing experiments, conducting experiments, collecting data, analyzing results, and interpreting findings to examine complex engineering problems.
P6	**Global Impact of Engineering Applications**: Knowledge of the impact of engineering applications on society, health and safety, the economy, sustainability, and the environment

	within the framework of the UN Sustainable Development Goals (SDGs); awareness of the legal implications of engineering solutions.
P7	**Ethical Behavior**: Adhering to professional engineering ethics; knowledge of ethical responsibilities; awareness of acting impartially, ensuring inclusivity, and avoiding discrimination in all matters.
P8	**Individual and Teamwork**: The ability to work effectively both individually and as a member or leader of disciplinary and interdisciplinary teams (face-to-face, remote, or hybrid).
P9	**Verbal and Written Communication**: The ability to communicate technical topics effectively in oral and written form while considering the diverse backgrounds of the target audience (such as education, language, and profession).
P10	**Project Management**: Knowledge of professional practices such as project management and economic feasibility analysis; awareness of entrepreneurship and innovation.
P11	**Lifelong Learning**: The ability to engage in independent and continuous learning, adapt to new and emerging technologies, and think critically about technological advancements.

Contribution of Course Learning Outcomes to Program Competencies/Outcomes											
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**
L1	✓										
L2		✓									
L3			✓								
L4				✓							
L5				✓							