



## Course description:

This course is an introduction to software design patterns. Each pattern represents a best practice solution to a software problem in some context. The course will cover the rationale and benefits of object-oriented software design patterns. Several example problems will be studied to investigate the development of good design patterns. Specific patterns, such as State, Adapter, Strategy, Decorator, Abstract Factory, etc will be discussed. Programming projects in the Java language will provide experience in the use of these patterns.

## Aims of the course:

1. Describe the principles, concepts, and practice of the design process.
2. Explain the processes of constructing the different types of information systems.
3. Show differences between design and coding.
4. Introduce the most common design patterns.
5. Design and development the information systems in a real world environment.

## Intended Learning Outcomes: (ILOs)

### A. Knowledge and Understanding

- A1. Identify the design process and its importance in various projects.
- A2. Understand the concept of design pattern and its catalog.
- A3. Understand how to solve different problems using design patterns.
- A4. Understand how to use and select the design patterns.

### B. Subject-specific skills

- B1. Analyze the presented problem effectively.
- B2. Ability to select and choose the appropriate design pattern to solve the problem.
- B3. Ability to compare different types of design patterns.
- B4. Find out the correct uses for each pattern.

### C. Critical-Thinking Skills



- C1. Learn the essentials of the design phase.
- C2. Understand the techniques and methods of design.
- C3. Distinguish between the different types of design patterns.

**D. General and Transferable Skills (other skills relevant to employability and personal development)**

- D1. Work in a group in order to design and implement solutions of real-world problems using design patterns.
- D2. Deploy communication skills.
- D3. Discuss several case studies.

**Course structures:**

Week	Credit Hours	ILOs	Topics	Teaching Procedure	Assessment methods
1 <sup>st</sup> and 2 <sup>nd</sup> week	6	A1, A2, B1, C1, C2.	<ul style="list-style-type: none"> <li>- Course introduction. Review of the software design context in relation to design patterns.</li> <li>- Introduction of creational d patterns.</li> <li>- Builder and Factory patterns.</li> </ul>	<ul style="list-style-type: none"> <li>• Lecturing with active participation.</li> <li>• Cooperative learning and discussion.</li> <li>• Reading lecture notes.</li> </ul>	Assignment 1
3 <sup>rd</sup> to 4 <sup>th</sup> week	6	A3, A4, B2, C3, D1.	<ul style="list-style-type: none"> <li>- Singleton pattern.</li> <li>- Abstract Factory pattern.</li> <li>- Prototype pattern.</li> <li>- Case study 1.</li> </ul>	<ul style="list-style-type: none"> <li>• Lecturing with active participation.</li> <li>• Cooperative learning and discussion.</li> <li>• Reading lecture notes.</li> </ul>	Quiz-1
First Exam					
5 <sup>th</sup> to 6 <sup>th</sup> week	6	A2, A3, B3, D2.	<ul style="list-style-type: none"> <li>- Introduction of structural design patterns.</li> <li>- Adapter, Bridge, Composite, Decorator and Facade patterns.</li> </ul>	<ul style="list-style-type: none"> <li>• Lecturing with active participation.</li> <li>• Cooperative learning and discussion.</li> <li>• Reading lecture</li> </ul>	Class Participation



				notes.	
7 <sup>th</sup> to 9 <sup>th</sup> week	6	A2, A3, B3, D1, D2.	<ul style="list-style-type: none"> <li>- Flyweight and Proxy patterns.</li> <li>- Case study 2.</li> <li>- Introduction of behavioral design patterns.</li> </ul>	<ul style="list-style-type: none"> <li>• Lecturing with active participation.</li> <li>• Cooperative learning and discussion.</li> <li>• Reading lecture notes.</li> </ul>	Quiz-2
Second Exam					
10 <sup>th</sup> and 12 <sup>th</sup> week	6	A3, A4, B4, C3, D4.	<ul style="list-style-type: none"> <li>- Chain of responsibility, Command and State patterns.</li> <li>- Case study 3.</li> </ul>	<ul style="list-style-type: none"> <li>• Lecturing with active participation.</li> <li>• Cooperative learning and discussion.</li> <li>• Reading lecture notes.</li> </ul>	Assignment 2 Class Participation
13 <sup>th</sup> and 14 <sup>th</sup> week	6	A4, C3, D4.	<ul style="list-style-type: none"> <li>- Review</li> <li>- Case study 4.</li> </ul>	<ul style="list-style-type: none"> <li>• Lecturing with active participation.</li> <li>• Cooperative learning and discussion.</li> <li>• Reading lecture notes.</li> </ul>	Assignment 3

## References:

### A. Main Textbook:

Design Patterns Explained By Alan Shalloway, Pearson Education. Second edition.

### B. Supplementary Textbook(s):

JAVA Enterprise Design Patterns Vol-III By Mark Grand ,Wiley DreamTech.



Head First Design Patterns By Eric Freeman, Oreilly-spd. First Edition.

**Assessment Methods:**

<b>Methods</b>	<b>Grade</b>	<b>Date</b>
First Exam	20%	
Second Exam	20%	
Assignments (Reports /Quizzes/ Class Participation)	10%	
Final Examination	50%	

