**NATIONAL UNIVERSITY OF MODERN LANGUAGES ISLAMABAD**

**DEPARTMENT OF SOFTWARE ENGINEERING**

**BSSE PROGRAM**

**Software Design and Architecture – COURSE OUTLINE**

1. **Course Details**

|  |  |
| --- | --- |
| **Credit Hours:** | 2+1 |
| **Pre-requisite(s):** | Software Requirement Engineering |
| **Instructor:** | Ms Saadia Shabbir |
| **Recommended Book(s):** | 1. Software Engineering design theory and practices by carles e otero |
| **Reference Books:** | 1. Applying UML And Patterns: An Introduction to Object Oriented Analysis And Design And Iterative Development, Craig Larman, 3rd Ed, Pearson Education, 2005. 2. Documenting Software Architectures: Views and Beyond By Paul Clements, Felix Bachmann, Len Bass, 3. Design Patterns: Elements of Reusable Object-Oriented Software |

1. **Course Learning Outcomes (CLOs)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CLOs** | **Description** | **Domain** | **Taxonomy Level** | **PLOs** | **Assessment Artifacts** |
| **CLO 1** | Understand fundamental design and architecture concepts in software systems | C | 2 | 1, 2 | A1, Q1, Midterm exam |
| **CLO 2** | Apply UML to Comprehend the design challenges as well as document the design of software systems | C | 4 | 3 ,4, 5 | A2, Q2, Midterm exam, Lab |
| **CLO 3** | Analyze software design patterns and architectural styles for particular and complex software design problems | C | 3 | 2,4 | A3,Q3, final term, lab |
| **CLO 4 (lab)** | Apply the concepts of UML based modeling, relative design patterns and architectural styles into designing real world software problems/ projects. | C | 5 | 2,3,5 | A3, Q3, Final Exam, Lab |

1. **Course Assessment**

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| --- | --- | --- |
| **Evaluation Methods** | **Theory weight (%) [T]** | **Lab Weight (%) [L]** |
| **Quizzes** | **10** | **10** |
| **Assignments** | **10** | **10** |
| **Mid Term** | **30** | **30** |
| **Final Term** | **50** | **50** |
| **Total** | **100** | **100** |
| **Total = T+L** | **T =(T/100)\*75** | **L =(L/100)\*25** |

1. **Grading Policy**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **A1** | **A2** | **A3** | **B1** | **B2** | **B3** | **C1** | **C2** | **D** | **F** |
| **%age** | >=90 | 80-89 | 77-79 | 74-76 | 70-73 | 67-69 | 64-66 | 60-63 | 50-59 | <50 |
| **GPA** | 4.00 | 4.00 | 3.66 | 3.33 | 3.00 | 2.66 | 2.33 | 2.00 | 1.50 | 0.00 |

1. **Course Contents**

Software Design and Architecture Concepts, Design principles, Object-Oriented Design with UML, Architecture views, User interface design, Persistent layer design, Web applications design, State machine diagrams and modeling, Design Patterns, Architectural design issues, , Software Architecture, Architectural Structures & Styles-, Architectural Patterns,

1. **Weekly Breakdown**

|  |  |  |  |
| --- | --- | --- | --- |
| **Week No.** | **CLO** | **Topics** | **Reference book** |
| 1 | CLO 1 | Course Outline and assessment Criteria, Introduction to course, why to design with examples, what is engineering design, need of software engineering design , levels of design (detailed design and architectural design), importance of design , design goals , design tradeoff, | **Chapter 1** |
| 2 | Design challenges, what is software design , software design process , Software Design principles, Design considerations | **Chapter 1** |
| 3 | Introduction to Software design with UML, Classification of UML diagrams | **Chapter 2** |
| 3 | CLO 2  CLO 4 | 4+1 model view software architecture ,Introduction to use case diagram ,Include/Exclude relation Use case identification | **chapter 6 from reference book 1** |
| 4 | Generating Use case diagram (scenario view) Writing brief casual and fully dressed use case | **chapter 6 from reference book 1** |
| 5 | Introduction to class diagrams(logical view),Linking classes of Class Diagram through associations , class diagram generation | **chapter 16 from reference book 1** |
| 6 | Introduction to Activity Diagram (process view), Fork and join Swim Lanes, Activity Diagram Generation | **chapter 28 from reference book 1** |
| 7 | Introduction to Sequence diagram (process view), Message passing and its types, Loop and condition in sequence diagram, frames in sequence diagram Practice Problems | **chapter 10 from reference book 1** |
| 8 | MID TERM WEEK |  |
| 9 | Introduction to state diagram (process view), Naming conventions Practice problems | **chapter 13 and chapter 29 from reference book 1** |
| 10 | **D**evelopment View(Component Diagram) using UML  Physical View(Deployment Diagram) using UML | Chapter # 37 from book 2 |
| 11 | CLO 3  CLO 4 | Introduction to design patterns Motivation for Design Pattern, Categories of Design Patterns  **Creational design patterns** abstract factory builder and singleton | **Chapter 6** |
| 12 | **Structural design patterns:** adapter decorator and façade | **Chapter 7** |
| 13 | **Behavioral design patterns:** chain of responsibility , interpreter, | **Chapter 7** |
| 14 | CLO 4 | Software architecture introduction  Architectural Styles and their types (pipe and filter style, client server style) | **Chapter 4** |
| 15 | Architectural Styles and their types(blackboard style and layered style) | **Chapter 4** |
| 15 |  | **Revision and project demos** |  |
| 16 |  | **Revision and project demos** |  |