**NATIONAL UNIVERSITY OF MODERN LANGUAGES ISLAMABAD**

**DEPARTMENT OF SOFTWARE ENGINEERING**

**Software Design and Architecture (SESD-202)**

**COURSE OUTLINE– BSSE PROGRAM**

**Course Details**

| **Credit Hours** | 3 (2+1) |
| --- | --- |
| **Pre-requisite(s)** | Software Requirement Engineering |
| **Course Leader** | Syed Hasnain Abbas Bukhari |
| **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, 2nd Edition, 2002 3. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, John Vlissides, Richard Helm, Ralph Johnson, 1994 |

**Course Learning Outcomes (CLOs)**

| **CLOs** | **Description** | **Domain** | **Taxonomy Level** | **PLOs** | **Assessment Artifacts** |
| --- | --- | --- | --- | --- | --- |
| **CLO 1** | **Understand** fundamental design and architecture concepts in software systems | Cognitive | 2 | 1 | A1, Q1, Midterm exam |
| **CLO 2** | **Apply** UML to Comprehend the design challenges as well as document the design of software systems | Cognitive | 4 | 5 | A2, Q2, Midterm exam |
| **CLO 3** | **Analyze** software design patterns and architectural styles for particular and complex software design problems | Cognitive | 3 | 2 | A3, Q3, final term |

**Course Assessment**

| **Assessment Theory** | | **Assessment Lab** | |
| --- | --- | --- | --- |
| **Evaluation Methods** | **Weight (%) [T]** | **Evaluation Methods** | **Weight (%) [L]** |
| Quizzes | 15 | Lab Reports |  |
| Assignments | 10 | Midterm Assessment |  |
| Presentation/Project | 10 | Final Term Assessment (Final Project) |  |
| Midterm | 25 |  |  |
| Final Term | 40 |  |  |
| Total | 100 |  |  |
| **Total (T+L)** | **T =(T/100)\*75** | **Total (L)** | **25** |

**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 |

**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,

**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 |
| 4 | CLO 2 | 4+1 model view software architecture ,Introduction to use case diagram ,Include/Exclude relation Use case identification | Chapter 6 [Ref. Book 1] |
| 5 | Generating Use case diagram (scenario view) Writing brief casual and fully dressed use case | Chapter 6 [Ref. Book 1] |
| 6 | Introduction to class diagrams(logical view),Linking classes of Class Diagram through associations , class diagram generation | chapter 16 [Ref. Book 1] |
| 7 | Introduction to Activity Diagram (process view), Fork and join Swim Lanes, Activity Diagram Generation | Chapter 28 [Ref. Book 1] |
| 8 | 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 [Ref. Book 1] |
| 9 | MID TERM WEEK |  |
| 10 | Introduction to state diagram (process view), Naming conventions Practice problems | Chapter 13, and Chapter 29 [Ref. Book 1] |
| 11 | Development View(Component Diagram) using UML  Physical View(Deployment Diagram) using UML | Chapter 37 [Ref. Book 2] |
| 12 | CLO 3 | Introduction to design patterns Motivation for Design Pattern, Categories of Design Patterns  Creational design patterns abstract factory, builder and singleton | Chapter 6 |
| 13 | Structural design patterns: adapter & decorator , Behavioral design patterns | Chapter 7 |
| 14 | Software architecture introduction  Architectural Styles and their types (pipe and filter style, client server style) | Chapter 7 |
| 15 | Architectural Styles and their types(blackboard style and layered style) Project Demos | Chapter 4 |
| 16 | Revision and project demos | Chapter 4 |