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| D:\UAAR\UIIT\courseOutlineCommittee\CourseContents_Final_V02\New folder\logo4.png | **PMAS Arid Agriculture University Rawalpindi**  **University Institute of Information Technology** | | | | C:\Users\Shahid\Downloads\IMG-20210824-WA0001.jpg |
| CS-553 Object Oriented Analysis and Design | | | | | | |
| **Credit Hours** | | **3(2-3)** | **Prerequisites** | **CS-453** | | |
| **Teacher:** | |  |  |  | | |

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| **Course Description:** |
| Introduction to Software Engineering, Modeling with UML, Project Organization and Communication, Requirements Elicitation, Analyses, System Design: Decomposing the System, Addressing Design Goals, Object Design: Reusing Pattern Solutions, Specifying Interfaces, Mapping Models to Code, Testing, Rationale Management, Configuration Management, Project Management, Software Life Cycle, Methodologies: Putting It All Together. |
| **Course Objective:** |
| The course will cover an object oriented approach, at present, is the method of choice for the software industry to develop different software. Instead of viewing the problem domain as a sequence or set of procedures, the emphasis in OOAD is on entities that interact with one another while making a design closer to the problem domain and the way human beings think and understand the real world. Goals in this course we will learn to perform Analysis on a given domain and come up with an Object Oriented Design (OOD). Various techniques will be discussed and practiced which are commonly used in analysis and design phases in the software industry.  Unified Modeling Language (UML) will be used as a tool to demonstrate the analysis and design ideas. Various cases studies will be used throughout the course to demonstrate the concepts learned in theory. A strong in class participation from the students will be encouraged and required during the discussion on these case studies. |
| **Teaching Methodology:** |
| Lectures, Assignments. Quizzes, Lab Work, Class Project |
| **Course Assessment:** |
| Exams, Assignments, Quizzes. Course will be assessed using a combination of written examinations. |
| **Text Book, Reference Books & Material:** |
| * Object Oriented Software Engineering: Using UML, Patterns, and Java, Bernd Bruegge, Allen H. Dutoit, Prentice Hall, 2010. * Object Oriented Software Engineering, Singh, Yogesh Malhotra, Ruchika, PHI Learning,2012. * Object Oriented Software Construction, Bertrand Meyer, 7thEdition, Prentice Hall, in2015. |

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| **Course Learning Outcomes (CLOs):** | | |
| At the end of the course the students will be able to: | **Domain** | **BT Level\*** |
| 1. Explain basic concepts of object oriented software engineering using UML. | C | 1 |
| 1. Develop OOSE design for problems based on real world scenarios. | C | 2 |
| 1. Explain fundamentals of software project management and software life cycle methodologies. | C | 2 |
| 1. Develop a “real world” software system prototype using Object Oriented Software Engineering. | C | 3 |
| \* BT= Bloom’s Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective doma | | |

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| **Week/**  **Lectures #** | | **Theory** | **Practical** |
| Week 1 | I | Introduction to Object Oriented Analysis and Design. |  |
| II | Principles of Object Oriented modeling |  |
| III | Object Model, Elements of object Model, Abstraction |  |
|  | IV | Encapsulation, Inheritance, Polymorphism. Overview of Object-Oriented Application? |  |
| Week 2 | I | Object-Oriented Methods, | Microsoft Project, |
| II | Introduction to UML | Rational Rose |
| III | The Unified Modeling Language (UML) | Rational Rose |
| IV | Use Cases Model |  |
| Week 3 | I | Expanded and Essential Use Cases |  |
| II | Use Cases and Functional Requirements, Special Requirements | Use case diagrams with Designing Tool. |
| III | Types of Use Cases, Use Case Format and Templates |  |
| IV | , Specifying Use Cases |  |
| Week 4 | I | Scope of use cases, Procedure to Find Use Cases, | E-Draw Max |
| II | Types of Actors, actors and goals via event analysis, | software architecture |
| III | Essential vs. real use cases, Use Case Diagrams | object-oriented design, |
| IV | Major Workflows Produce Models, Artifacts/Models in UP Workflows | Design doc, Rational Rose |
| Week 5 | I | Supplementary Requirements, Requirements, | SRS doc, Requirement |
| II | Standards, Goals and user Stories | design tool |
| III | Unified modeling language (UML), | (Rational Rose) |
| IV | Different views of UML |  |
| Week 6 | I | Interaction diagrams, | sequence and collaboration diagrams, |
| II | Sequence diagram, |
| III | Collaboration diagram | Rational Rose |
| IV | Activity diagram, State chart diagrams | Rational Rose |
| Week 7 | I | Class diagram, | OO analysis: discovering classes, |
| II | Domain Model |
| III | UML class properties | Rational Rose |
| IV | Component Diagram |
| Week 8 | I | Deployment Diagram | Draw.io |
| II | Deployment Diagram | Use designing tool |
| III | Service Oriented Architecture |  |
| IV | Service Oriented Architecture |  |
| **Mid Term Exam** | | | |
| Week 11 | I | Component Based Software Engineering | Smart Draw |
| II | Component Based Software Engineering |  |
| III | Software Product line development |  |
| IV | Software Product line development | E-Draw Max |
| Week 12 | I | Introduction to design pattern |  |
| II | Pattern description, |  |
| III | General hierarchy pattern |  |
| IV | Singleton pattern, Façade pattern, Factory pattern |  |
| Week 13 | I | Testing Activities, Testing Activities , Managing Testing | Software testing, Testing tool (JUnit) |
| II | Project Management: An Overview of Project Management, Project Management Concepts, |  |
| III | Classical Project Management Activities, |  |
| IV | Agile Project Management Activities |  |
| Week 14 | I | Rationale Management: An Overview of Rationale, Rationale Concepts, Rationale Activities: From Issues to Decisions, Managing Rationale |  |
| II | Configuration Management. | Configuration management tool (Source safe) |
| III | Software process overview, |
| IV | Activities, Managing, Configuration Management |
| Week 15 | I | Project Organization and Communication: Project Organization Concepts, | Project planning, Management tool (MS project) |
| II | Project Communication Concepts, Organizational Activities |
| III | Component Base Software Engineering |  |
| IV | Component Base Software Engineering |  |
| Week 16 | I | Methodologies: Putting It All Together, Project Environment, Methodology Issues, A Spectrum of Methodologies. |  |
| II | Presentations, Testing & Demonstration of Semester Projects user manual | Working Prototype |
| III | Presentations, Testing & Demonstration of Semester Projects user manual | Working Prototype |
| IV | Presentations, Testing & Demonstration of Semester Projects user manual | Working Prototype |
| **Final Term Exam** | | | |