FAST National University of Computer and Emerging Sciences

Department of Computer Science, Peshawar Campus

Course Content, Objectives and Outline

(Spring 2023)

PROGRAM: BS-Computer Science
SEMESTER: Spring (2023)
COURSE: Software Engineering (CS3009)
PRE-REQUISITE: Software Design and Analysis
CREDIT HRS: 3
INSTRUCTOR: Usama Musharaf
Email: usama.musharaf@nu.edu.pk

Course Content:

Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modeling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.

Reference Books:

- Software Engineering, Sommerville I., 10th Edition, Pearson Inc., 2014

- Software Engineering, A Practitioner's Approach, Pressman R. S.& Maxim B. R., 8th Edition, McGraw-Hill, 2015.

Course Evaluation Criteria:

#	Evaluation	Weightage %
1	Assignments	15
2	Quiz	05
3	Sessional-I	15
4	Sessional-II	15
5	Finals	50
Total		**100**

Program Learning Outcomes (PLO's)

PLO 1	Computing Knowledge	Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems.	
PLO 2	Problem Analysis	Identify, formulate, research literature, and analyse complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.	
PLO 3	Design/Develop Solutions	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	✔
PLO 4	Investigation & Experimentation	Conduct investigation of complex computing problems using research based knowledge and research based methods	✔
PLO 5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources and modern computing tools, including prediction and modelling for complex computing problems.	
PLO 6	Society Responsibility	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to context of complex computing problems.	
PLO 7	Environment and Sustainability	Understand and evaluate sustainability and impact of professional computing work in the solution of complex computing problems	
PLO 8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of computing practice.	
PLO 9	Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	
PLO 10	Communication	Communicate effectively on complex computing activities with the computing community and with society at large.	
PLO 11	Project Management and Finance	Demonstrate knowledge and understanding of management principles and economic decision making and apply these to one's own work as a member or a team.	
PLO 12	Life Long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.	

Course Learning Outcomes (CLO's)

CLO	Name	PLO	Tools
1	Select an appropriate software development process for a software project.	4	
2	Develop a model of requirements for a software system.	3	
3	Design architecture of a software system by choosing the most appropriate architecture styles.	3	
4	Design test cases for a software system.	3	
5	Construct reasonable sized software in team setting with modern state of the art practices such as DevOps	3	

Tools description: A: Assignments, F: Final, S: Sessional, P: Project, Q: Quizzes

Weekly Distribution:

Week-1	Introduction to software engineering, Agile Development, (Extreme Programming, Scrum).
Week-2	Intro to Software Quality Engineering, Quality Models, Quality Engineering at SDLC phases. Requirement Engineering, Quality Engineering at RE phase.
Week-3	Conceptual Model of Architecture Representation, Architectural Views Views and View Point, 4+1 View Model, Uber Case Study (System Design),
Week-4	Architectural Styles, Categories of Architectural Style, Hierarchical Software Architecture, Data Flow Software Architecture.
Week-5	Data Centered/shared Software Architecture, Component based Software Architecture, Event based Software Architecture, Distributed Software Architectures,
Week-6	Quality Engineering at Architecture phase Software Quality Attributes, Performance and Scalability, Problems, Principles, Objectives, Metrics, Software Reliability, Fault Tolerant Design, Application Architecture to System Architecture.
Week-7	Introduction to DevOps, Software Configuration Management
Week-8	Version controlling with Git/Git Hub
Week-9	Introduction to Microservices Architecture, Large scale software development and deployment, Dockers Container
Week-10	Container Orchestration with Kubernetes
Week-11	Container Orchestration with Kubernetes (cont..)
Week-12	CI/CD Pipeline with jenkins
Week-13	Software Testing (Black Box, White Box)
Week-14	Performance Testing using Locust Tool
Week-15	Performance Testing using Locust Tool