

SWE 502 – ADVANCED SOFTWARE DESIGN AND ARCHITECTURE

Instructor: Dr. Zakarya Alzamil

Office: 2117 - **Email:** zakarya@ksu.edu.sa

Required Course: (3+0+0) hours lecture per week

Course Description:

This course covers the principles and strategies for software architecture and design. Architectural styles and patterns, architecture-centric software design, modeling architectural design decision, architecture connectors, architecture analysis and implementation, applied architectures, designing non-functional properties, deployment and mobility, domain-specific architecture, component oriented design, and service-oriented architecture are presented. Students participate in a group project on software design and architecture and design tools.

Prerequisite(s): None

Textbook(s) and/or Other Supplementary Materials:

- Richard Taylor et al. (2010): Software Architecture: Foundations, Theory, and Practice, John Wiley & Sons. (**primary**)
- Len Bass et al. (2013): Software Architecture in Practice, 3rd edition, Addison-Wesley. (**optional**)
- Kai Qian et al. (2009): Software Architecture and Design Illuminated, Jones and Bartlett. (**optional**)

Supplementary:

- David Garlan and Mary Shaw, *An Introduction to Software Architecture*, January 1994, CMU-CS-94-166.
- Other journal papers and technical papers may be provided as needed.

Major Topics Covered* :

Introduction to Software Architecture & Design	Software Architecture in the Context
Architecture-Centric Software Design	Architectural Styles and patterns
Architecture Connectors	Modeling Architectural Design Decision
Architecture Visualization	Software Architecture Analysis
Software Architecture Implementation & deployment	Applied Architectures
Design Non-Functional Properties	Domain-Specific Software Engineering

* may be updated in accordance with the course pace and/or students' performance.

Assessment & Evaluation Plan for the Course:

Students' performance is evaluated based on the following assignments and exams.

Research Assignment	Student selects a research topic; write a literature review (introduction, research problem addressed, description of the current approaches, and conclusion including critiques of the current approaches). A minimum of 5 research papers within a certain research subject must be read and summarized.	15 points
Project	Teamwork semester project	20 points
Exams	Midterm	25 points
	Final	40 points

Policies:

- Type all assignments, you may use some tools e.g., Rational, ArchStudio, Visio, etc.
- Students can discuss assignment, but no copying!
- Late Submission Penalty (*50 % of earned points if submitted after the due date within one week, 0 if submitted late more than seven days of the due date*).

Calendar & Outline of Topics *

Week	Topics	Due Dates
1	Orientation and Beginning of the semester	
2	Introduction to Software Architecture	
3	Architecture in the Context	Team Formation
4	Basic Concepts	Project deliverable 1
5	Designing Architectures	
6	Architectural Styles I	
7	Architectural Styles II	Project deliverable 2
8	Architecture Connectors	MIDTERM
9	Architecture Modeling	
10	Architecture Visualization	Research paper submission & presentation
11	Architecture Analysis	
12	Architecture Implementation	Project deliverable 3
13	Deployment and Mobility	
14	Applied Architectures and Styles	Project deliverable 4
15	Designing for Non-Functional Properties	
16	Domain-Specific Software Engineering	Project Presentation & Demo
17-18	FINAL EXAMS	

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