BIRZEIT UNIVERSITY

Faculty of Engineering and Technology
Master of Software Engineering (SWEN)

SWEN6304: Software Design and Architecture
Second Semester 2018/2019

Instructor: Dr. Yousef A. Hassouneh Office Masri 322

Course Description

Advanced concepts about software design and software architecture. Design patterns, Architectural structures and styles, Methods for creating and analyzing software architecture, interaction between quality attributes and software architecture, software architecture validation and documenting architecture, in depth study of current software architecture research topics such as Services Oriented Architecture (SOA).
The course aims to provide students with comprehensive knowledge of system design and architecture evaluate and apply architecture designs through team project work and research investigation.

After this course, you should be able to

- Name, describe, and explain the foundational concepts of software architecture (viewpoints, views, perspectives, architectural styles and patterns, etc.) and the important principles and techniques of software architecture (design for change, modularity, traceability, etc.)
- Apply basic dependency analysis and visualization techniques and tools to understand the architectural design of an existing software system.
- Apply modeling and documentation techniques to describe large systems.
- Understand existing architectural descriptions and recognized common architectural styles and patterns (layered, peer-to-peer, service-oriented, etc.) and evaluate architectural documentation for quality and completeness.
- Describe and explain common techniques for analyzing and managing architectural knowledge.
- apply software architecture principles and techniques to design software architectures taking into account both functional and non-functional requirements
- Create a complete architectural description of an existing system.
- Describe and explain recent research developments in the field of software architecture.

Intended Learning Outcomes (ILOs):

The course aims to develop comprehensive understanding in software architectural design techniques and methods, and apply them through case studies, team project work and research investigations.

Knowledge and understanding

1. Master the basic concepts of software design and architecture.
2. Analyze software design process models
3. Compare Architectural Design Representations
4. Criticize design strategies and methods.
5. Review and assess designs
6. Perform design verification

Practical and subject specific skills (Transferable Skills).

1. Constructing systems from modules.
2. Design and implement different software architectures.
3. Formulate precise specifications of computer-based systems
4. Select the appropriate architecture for a system.

Cognitive skills (thinking and analysis).

1. Apply appropriate theories, principles and concepts relevant to software architecture and design models.
2. Analyze and interpret information from a variety of sources relevant to software architecture and design.
3. Analyze and evaluate the information in the domain of software design and architecture and take references from them for problem solving.

Schedule

Week		
1,2	Introduction to SW Design	Ch[2] from 2
3,4	Design Pattern	Ch [8] from 2
5	Introduction to software architecture	Ch [1-3] from 4
6,7	Architectural styles	Ch [4] from 1
8	Connectors	Ch [5] from 1
9,10	Quality Attribute	Ch [4-11] from 4
11,12	Architectural Analysis	Ch [13-14] from 4
13,14	Architectural Design	Ch [16-17] from 4
15	Architectural Documentation	Ch [18] from 4

Evaluation {Tentative grade distribution}

- Group Projects 35%
- Research Assignments and Presentation 15%
- Home Works 15%
- Final Exam 35%

References

1. *Taylor, Medvidovic, Dashofy. "Software Architecture: Foundations, Theory, and Practice". Wiley, 2009.*
2. *Bruegge and Dutoit, "Object-Oriented Software Engineering Using UML, Patternd, and Java". Prentice Hall 3rd Edition*
3. *Rozanski and Woods. "Software Systems Architecture: Working with Stakeholders Using Viewpoints and Perspectives", Addison-Wesley Professional, 2nd Edition, 2011.*
4. *L. Bass, P. Clements, R. Kazman. "Software Architecture in Practice", 3rd Edition. Addison Wesley Professional, 2003.*
5. *E. Gamma, R. Helm, R. Johnson, J. Vlissides "Design Patterns: Elements of Reusable Object-Oriented Software". Addison-Wesley, 1994*