



### Course Title SENG 422 – Software Architecture

Term – SUMMER 2015 (201505)

#### Instructors

Dr. Imen Bourguiba  
Phone:  
E-mail: imenbour@uvic.ca

#### Office Hours

Days: Monday  
Time: 12:00 p.m. - 1:00 p.m.  
Location: EOW 419

Dr. Haytham El Miligi

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E-mail: Haytham@ece.uvic.ca

#### Course Objectives

- This course focuses on the decision-making process underlying software architecture design, and the selection and application of suitable architecture design strategies, mechanisms and technologies. Software architecture is viewed as a collection of software components interacting or communicating via a collection of software connectors. The focus of the course will be on identifying and designing software components and connectors by adopting appropriate design strategies, architectural styles, and technologies.

#### Learning Outcomes

By the end of this course, students should have a good grasp of the following:

- The need for software architecture and fundamental concepts underlying software architecture
- Major software design techniques
- Architecture documentation using architecture description languages
- Architectural styles and patterns
- Techniques, models, and metrics used to analyze, design, and evaluate large-scale software architecture

#### Syllabus

- *Unit 1. Introduction to Software Architecture*

Define the discipline of software architecture and introduce fundamental concepts underlying this discipline.

A particular emphasis will be placed on the following:

- Notions of Views and Viewpoints.
- Place of software architecture in the whole software life cycle.
- Discussion of the issues surrounding modern software architecture design: abstraction, reusability etc.

### *Unit 2. Architecture and Requirements*

Introduce the concept of Architecturally Significant Requirements (ASR) and present systematic way to capture and express quality attributes requirements under the form of quality attributes scenarios.

### *Unit 3. Architecture Design*

Provide a general overview of software design techniques, and then focus in detail on the Attribute-Driven Design (ADD) technique. Emphasis will be placed on the identification of software architectural drivers or tactics and the use of these drivers to guide the design of software architecture.

### *Unit 4. Documenting Software Architectures*

Present notions and concepts of software components and connectors and their place in software architecture. Emphasis will be placed on components/connectors identification, design, and modeling using a standard architectural description language (ADL). Emphasis will also be placed on selection and application of components communication and control patterns.

### *Unit 5. Architectural Styles*

Define the notions and needs for architectural styles as major building for software architecture, and introduce major architectural styles such as data flow styles, independent component styles, c and service-oriented architectural (SOA) style.

### *Unit 6. Performance Quality Attribute*

Introduce methods and techniques to evaluate and improve software architecture from performance standpoint. Present techniques and models for software performance analysis, prediction, and design.

### *Unit 7. Availability Quality Attribute*

Introduce techniques and models for software availability analysis and design. Present basic notions of software fault tolerance and give an overview of software fault tolerance techniques and architectures.

### *Unit 8. Security Quality Attribute*

Introduce techniques and models for software security analysis and design.

### *Unit 9. Modifiability Quality Attribute*

Introduce techniques and models for software modifiability analysis and design. Present modifiability metrics and structural analysis techniques.

#### *Unit 10. Economic Analysis of Architectures*

Introduce techniques and models for cost-benefit analysis based on architectural requirements and design decisions.

**A-Section(s):** A01 / CRN 30726 B01 T 16-18:50 TA ([philipbaback\\_orbsix@msn.com](mailto:philipbaback_orbsix@msn.com))  
A02 / CRN 30727 Location: ELW B220  
**Days:** Monday, Thursday  
**Time:** 13-14:20  
**Location:** DSB C128

#### **Required Text**

**Title:** Software Architecture in Practice  
**Author:** L. Bass, P. Clements, R. Kazman  
**Publisher:** Addison Wesley  
**Year:** 2013, 3<sup>rd</sup> edition

#### **Optional Text**

**Title:**  
**Author:**  
**Publisher:**  
**Year:**

#### **References:**

#### **Assessment:**

Attendance/Class Participation:	5%	
Labs	35%	Due Dates: (Part 1: 8%; Part 2: 12%; Part 3: 15%)
Mid-term	20%	Date: June 11, 2015
Final Exam	40%	

#### **Note: (sample notes for the instructors)**

Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.  
Failure to pass the final exam will result in a failing grade for the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

**There will be no supplemental examination for this course.**

#### **Note to Students:**

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

**Accommodation of Religious Observance**

<http://web.uvic.ca/calendar/GI/GUPo.html>

**Policy on Inclusivity and Diversity**

<http://web.uvic.ca/calendar/GI/GUPo.html>

**Standards of Professional Behaviour**

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour in current Undergraduate Calendar, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult entry in current Undergraduate Calendar for the UVic policy on academic integrity.

<http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

**Course Lecture Notes**

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.