CONCORDIA UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

SOEN 6471: ADVANCED SOFTWARE ARCHITECTURES: SECTION CC
SUMMER 2016

COURSE OUTLINE

1. INTRODUCTION

The purpose of the present offering of SOEN 6471 is manifold:

- To introduce **state-of-the-art in theoretical as well as practical aspects of the discipline of software architecture** that are considered essential to the development of software-intensive systems. In doing so, the attention will primarily be on **software architecture modeling and software architecture quality**.

- To instill **primary learning (cognitive, affective, and experiential)** as well as instigate **secondary learning**.

- To impart certain **'hard skills'** as well as **'soft skills'** (including, but not limited to, **lifelong skills** and **employability skills**) currently deemed necessary for **post-graduate commitments** and for being viewed as a **'competent' software engineer** (ethically, technically, and socially, as, for example, suggested by the **SWEBOK** and the **SWECOM**).

2. PREREQUISITES

COMP 5541 is the prerequisite course as per the Graduate Calendar.

It is expected that a student has (1) background in basic discrete mathematics, including logic, sets, relations, and graphs; (2) background in software engineering, including exposure to software processes, software requirements (including use cases), and the Unified Modeling Language (UML); (3) experience in technical writing; (4) skill in diagramming; (5) skill in a current object-oriented programming language; (6) experience in making technical presentations; (7) experience in working in a team environment; and (8) the ability of independent decision making.

3. ADMINISTRATION

The course is subject to the **Course Protocol** available on the course Web Site.

There are three types of people directly responsible for administration.

Coordinator: P. Rigby; Instructor: P. Kamthan; Teaching Assistants: S. Hilal and A. Varshoi.

4. COMMUNICATION

There are three means of asynchronous/synchronous communication.

WEB

The URL of the Home Page of the course Web Site is:

`http://users.encs.concordia.ca/~kamthan/courses/soen-6471/`.

It is suggested that students check the Home Page regularly for latest announcements and information.

ELECTRONIC MAIL

The optimal means for corresponding with the instructor outside the classroom is via e-mail at the address `kamthan@cse.concordia.ca`.

It is expected that a student follows the **Communication Protocol** in an e-mail correspondence.

In a **project-related correspondence**, the entire team should be copied on the message.

IN-PERSON

The office address is EV 3.301. The instructor can be available by appointment if the need for it is properly rationalized by the student making the request.

5. COURSE MATERIAL

COVERAGE

> The object of a course is not to cover the material but to uncover part of it.
> — Joseph P. LaSalle

The discipline of software architecture is maturing. There are several **critical, equally significant, not necessarily comparable, paths** through any field, and software architecture is no different. This course should be viewed as **'a'** rather than **'the'** course on software architecture. In general, the coverage will be **interplay between depth and breadth**.

The following is a broad list of topics to be covered, **directly or indirectly**, in the course: Context of Software Architecture, Software Process Models and Software Architecture, Stakeholders of Software Architecture, Quality of Software Architecture, Design of Software Architecture, Views of Software Architecture, Experiential Knowledge in Software Architecture (Principles, Tactics, Styles, Patterns, Anti-Patterns, Standards, Reference Architectures), Description of Software Architecture, Languages for Describing Software Architecture, Conceptual Modeling, UML and UML Extensions for Software Architecture Description, Evaluation of Software Architecture, Software Architecture Reviews, Software Product Line Architectures, Case Studies on Software Architectures.

This list of topics may evolve according to the needs of the class. The class will be informed in case of changes.

RESOURCES

For lectures, no single resource (such as a book) will be adopted and followed as-is. The lecture notes and related material (such as readings) pertaining to the course will be made available on the course Web Site. These are prone to change, and changes will be duly announced. The students are **encouraged** to provide feedback on the lecture notes during the term.

The lecture notes aim to be **original** in some manner, and are **'living documents'** prone to perpetual evolution. The purpose of the readings is to (a) expose the topic, (b) identify the author(s), and (c) underscore the publishing source, and, in doing so, highlight sources that are **authoritative** in some sense. The students may seek clarifications on any readings assigned. However, it is expected that the students are accustomed to **independent study** and possess the ability of **critical thinking** necessary to derive conclusions from any readings assigned.

6. ASSESSMENT

The course assessment is based on **three** complementary but interdependent elements, namely **participation, tests, and project**.

In general, the course will **not accommodate exceptions** based on **individual grounds and/or personal reasons**. In particular, the schedules (dates/times) for submission of project deliverables, and the schedules (dates/times) of the tests, are **non-negotiable**. For the sake of fairness, exceptions, if any, will only be made if they apply to the entire class, not to individuals.

PARTICIPATION

The participation of students will be assessed by one or more of the following: attendance in the class, questions or pointers to resources that benefit other students, and suggestions for improving course material.

TESTS

There will be **three** tests, including a **prerequisite test**, named Test 0, during the term. The tests will be subject to the **Test Protocol**. The style of tests, in principle, is suggested by **A Manifesto on Testing**. In general, missed tests cannot be made up.

The tests will be based on the **lecture notes, mandatory readings, exercises assigned, and/or public discussions** during the classes. The **requisites** for the course are relevant towards the tests. The knowledge of the course material for Test m will also be **relevant** for Test n, where n > m; however, the syllabuses of the tests may or may not be cumulative. The syllabuses and schedules of the respective tests will be announced on the course Web Site.

PROJECT

There will be a team project aimed at examining different **process- and product-related aspects** of architecture. The work related to the project will be subject to the **Communal Work Protocol**.

To carry out the project, the class will be organized into teams of equal or almost equal size. For each team, the **roles and responsibilities** for each team member, for each deliverable, are to be **decided collectively** by all members of that team, by themselves. It is in the interest of each student to work **individually as well as communally**. A larger team will be expected to **demonstrably** do more work compared to a team of a smaller size.

The project will consist of **four** deliverables. The deliverables will be due at unequal intervals during the term. Further details on the project will be covered during the lectures and/or announced on the course Web Site as the course progresses.

The marking for the deliverables will be **entirely individual**. A deliverable will be assigned a baseline mark, but the marks for individuals may vary. The individuals marks for a given deliverable will depend on, apart from the conditions outlined in the description of that deliverable, (1) a **match between the responsibilities and the contribution**, by an individual, to that deliverable, and (2) for **noteworthy involvement** (such as, posing questions, providing feedback on project-related material, or pointing out resources, useful to his/her team or to other teams). The individual marks will be measured, in part, by the **Form for Assessing Individual Contribution in a Collective Work Environment**.

A team member who has **insignificant verifiable contribution** towards a deliverable will receive 0 marks for that deliverable. A team member who does not fill out and submit a copy of the Form for Assessing Individual Contribution in a Collective Work Environment will receive 0 marks for that deliverable. A team member who is absent during the fourth deliverable will receive 0 marks for that deliverable.

MARKING

The letter course grade will be based on the following distribution of weights:

Participation		= 02% Marks
Tests	$T_0(4\%) + T_1(30\%) + T_2(34\%)$	= 68% Marks
Deliverables	$D_1(6\%) + D_2(14\%) + D_3(6\%) + D_4(4\%)$	= 30% Marks

In order for a student to pass the course, a passing mark must be obtained in **each** of the following elements: collectively in the tests and collectively in the project deliverables.

It should be noted that marking is **absolute in some cases and relative in other cases**. This has certain implications, including that the highest overall marks in the class do not necessarily mean the highest possible grade, and the lowest overall marks in the class do not necessarily mean the lowest possible grade.

The marks will be made public so that a student can track his/her progress, absolutely and relatively (with respect to the rest of the students in the class, especially with respect to the **class average**).

GRADING

There is no fixed, a priori, relationship between the marks expressed as a numerical percentage and the final letter grade for the course, except that a higher percentage corresponds to a better grade. In conformity with the policy of the Department of Computer Science and Software Engineering, the determination of final letter grades from total percentages is not established according to fixed levels, but is scaled to ensure fairness and accuracy.

The grades are assigned based on **performance** only and not on any other criterion.

It is expected that, related to any issues pertaining to marking or grading, each student has **read and understood** the documents entitled **Expectations of Originality**, **Fairness Protocol**, and **Reassessment Protocol** made available on the course Web Site.

7. GENERAL

It is important that each student understands the **constants** pertaining to the course, the **variables** pertaining to the course, and the difference between the constants and the variables. In particular, a constant should not be converted into a variable.

ACADEMIC CONDUCT

It is assumed that a student registered in this course is aware of and understands the rules outlined in the Concordia University's Academic Code of Conduct, and agrees to abide by them. In particular, the **burden of proof of originality** of work rests on the student.

TIME LINES

The time lines for any form of assessment (including the tests and project deliverables) are to be followed as-is. In general, any non-compliance will result in a non-assignment of marks. In particular, any delay in the submission of project deliverables, or a non-attendance at any test, for any reason whatsoever, apart from the reasons listed below, will result in 0 marks.

ABSENTEEISM/NON-SUBMISSION

There must be a compelling reason for a student not being able to comply towards any mode of assessment (such as, not appearing for a test due to certain event). The student must submit the reason in **writing** supported by appropriate documents (such as, in case of a medical condition, a doctor's note **only** from the Concordia University Health Services) for any consideration (to be determined by the instructor, whose decision will be binding and final in this matter) within **one week** of the respective event.

OTHER

Note from the University Administration: In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

8. DISCLAIMER

This course outline should be viewed as an agreement between the instructor and a student with respect to the course, by which both are bound. It is assumed that each student who is registered in the course has **read and understood** the contents of this course outline. **Any** clarifications, if necessary, of the contents of this course outline **must** be sought **no later than the day of the second lecture**.