Course Outline

Professor: Samuel A. Ajila, PhD, P.Eng
Office: MC 7038, Office Hours: Thursday 1 to 2 pm

Course Calendar Description:
Introduction and importance of software architectures and software system design in software engineering. Current techniques, modelling notations, method processes and tools used in software architecture and system design. Software architectures, architectural patterns, design patterns, software qualities, software reuse.

Course Description and Objectives:
The process of a typical software development (requirements elicitation to code generations) is divided into two courses: SYSC-3120 and SYSC-4120. SYSC-3120 focuses on requirements elicitation and software analysis and is a pre-requisite to SYSC-4120, which focuses on system design, software architecture, and object design.

The three main goals of this course are:
- To understand the role of software system design and design activities;
- To understand the role of object design;
- To master model-based software system design by using the UML and OCL;

The two main objectives of this course are:
- To conduct system design using architectural patterns and design patterns;
- To conduct object design.

Prerequisites:
Students who have not satisfied the prerequisites for this course must either a) withdraw from the course, or b) obtain a prerequisite waiver from www.sce.carleton.ca/ughelp, or c) may be deregistered from the course after the last day to register for courses.

Lectures:
When: Wednesday and Friday – 11:35 am to 12:55 pm
Where: ME 4494

Laboratory Sessions (compulsory):
When: Thursday from 2:35 pm to 5:25 pm (every other week)
Where: CB 5109

Students with conflicts: see the Undergraduate Calendar for regulations.

Note: This course has substantial engineering design components (75%) and engineering science (25%). So, this is an engineering design course. We will use UML and OCL as design languages in this course.
Recommended text:

Grading Scheme:
A maximum of 100 marks will be available. The division is as follows:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weights</th>
<th>Dates</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>15%</td>
<td></td>
<td>All students are expected to attend and do all labs. A no show will be graded 0 (zero)</td>
</tr>
<tr>
<td>Assign#1</td>
<td>5%</td>
<td>Sept. 21</td>
<td>Oct. 13</td>
</tr>
<tr>
<td>Assign#2</td>
<td>5%</td>
<td>Oct. 30</td>
<td>Nov. 15</td>
</tr>
<tr>
<td>Assign#3</td>
<td>5%</td>
<td>Nov. 15</td>
<td>Dec. 6</td>
</tr>
<tr>
<td>Labs</td>
<td>25%</td>
<td>Lab dates: Sept. 14 and 28; Oct. 12; Nov. 2, 16 and 30. Note that the last lab scheduled is reserved.</td>
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<tr>
<td>Mid-Term Exam</td>
<td>25%</td>
<td>Oct. 20, 2017 in class – <strong>There is no deferred Mid-Term Exam</strong></td>
<td></td>
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<tr>
<td>Final Exam</td>
<td>35%</td>
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- All exams (midterm and final) are closed book exams.
- A student is expected to pass (i.e. obtain at least 50% in) the final exam in order to pass the course.
- Each lab and each assignment is worth 5%
- **The mid-term exam will be held during regular class hours, on Friday, October 20, 2017. In general, there is no differed mid-term exam. Another midterm exam may be granted to a student due to sickness could not write the midterm exam. For such student who missed the midterm due to illness, a mandatory, original, signed, and stamped Doctor sick note is required. I will NOT accept scanned or photo copies of medical report!**

- Assignments are due at midnight of the due date and must be submitted on the course cuLearn.
  - Late assignments will be graded according to the following policy: a 20% penalty per day with a maximum of two late days after which the grade of 0 is assigned. The penalty starts at 12:05 am i.e. 5 minutes after mid-night due date.
- Laboratory work is due at the end of the laboratory session and must be submitted on the course cuLearn.
  - Late laboratory work will receive a grade of 0. A lab is considered late if submitted after 5:35 pm on the day of lab session.
  - There is no deferred lab and a no show or absent from lab will receive a grade of 0.
- Assignments: Students are encouraged to discuss issues when working on assignments; however, you are expected to submit your own work for grading. There is a fine line between cooperating with your colleagues (discussing problems and ideas) and copying solutions (plagiarism). Not only
is plagiarism an instructional offence (see the Undergraduate Calendar), but doing the assigned work by yourself is by far the best way to prepare for the exams.

- **Laboratories:** Students are encouraged to discuss issues and ideas but you are expected to submit your own work for grading, unless otherwise specified.

- **Final Exam:** *Is for the evaluation purposes only and will not be returned to the student.*

- **Final Exam:** Students who miss the final exam may be granted permission to write a deferred examination. *Section 2.5 of the Academic Regulations of the University applies in case of deferred final exam.*

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation** and **Religious obligation:** Visit the Equity Services website [http://carleton.ca/equity/accommodation/](http://carleton.ca/equity/accommodation/) and fill the relevant forms for accommodation. Inform me of any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. **All academic accommodation requests must be settled at least three weeks before any exam (midterm and final).**

**Academic Accommodations for Students with Disabilities**

The Paul Menton Centre [https://carleton.ca/pmc/](https://carleton.ca/pmc/) for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (if applicable). **All academic accommodation requests must be settled at least three weeks before any exam (midterm and final).**

**Plagiarism:**

Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the section on instructional offenses in the Undergraduate Calendar for additional information. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subjected to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; and/or a reprimand; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

**Health and safety:**

Tentative Course Outlines – Major Topics

1. Introduction to Software System Design – Week 1

2. System Design using UML and System Architecture
   - Definition and objectives, object-oriented design with UML, architectural design, detailed design, concurrent software, safety analysis and fault tolerance. - Weeks 2 – 4

3. Object Design - Weeks 5 - 6
   - Optimizing software architecture, optimizing class diagram.

4. Design Patterns – Weeks 7 – 8

5. Revisiting Design Patterns – Weeks 9 - 10

6. Other Software Engineering Issues – Weeks 11 - 12
   - Fault tolerance, real-time systems, verification and validation, re-engineering

Other useful readings include:

Get help early if you are having difficulty with the course content. Ways to get help are:
- Ask question in class. This is the best way to clear things up.
- Ask professor during office hours.
- You may Email to setup an appointment.
- Note that Email is not the best medium for technical questions! Questions submitted by Email will be answered at the beginning of the next class.

Miscellaneous:

Attendance:
Being (consistently) late to lectures and/or labs does not show professional behavior. Moreover, those students who miss lectures and/or labs may encounter difficulties as far as their final grade is concerned since (i) a lot of the material introduced during lectures is not necessarily in the slides provided on the course web site, and (ii) questions during the final exam will target the understanding of the concepts presented in class, lab activities as well as lab material.

Expectations:
I expect the students to invest a substantial amount of time and energy in reading the textbook and doing the assignments/lab works. Looking at or just reading the slides I will provide may not be enough to achieve the level of understanding that will be required for the mid-term and final exams.