Instructor

Prof. Samuel A. Ajila

TAs

TBD

Office Hours

Office: MC 7038 - Thursdays 10:00 am to 11:00 am and during lab session

Course 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 formal methods (e.g. OCL, LTL, 1st Order Logic);

The two main objectives of this course are:

- To conduct system design using architectural patterns and design patterns;
- To conduct object design.

Learning Outcomes

- Be able to use domain knowledge to identify, formulate, analyse complex software systems requirement
- Ability to clarify systems requirement definition and to deal with missing and/or badly-defined
requirements
- Be able to make reasonable assumption about systems requirements and design a solution that best match the requirements
- Conduct complex systems design using using appropriate engineering techniques and tools (e.g. UML, LTL, OCL, 1st Order Logic, etc.)
- Be able to measure, verify, and validate the end product (i.e. the software system).

Graduate Attributes
- Software Engineering, Software Engineering, Software Engineering, Software Engineering
  4.1 Clear design goals (See 11.1)
  4.2 Detailed design specifications and requirements (See 11.1)
  4.4 Design solution(s)
  4.5 Design implementation / Task(s) definition
  4.6 Alternate solution(s) definition

Course Web Site
Carleton Central - cuLearn

Textbook and References

Other useful readings include:

Evaluation and Marking Scheme

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.</td>
</tr>
<tr>
<td>Assign#1</td>
<td>5%</td>
<td>Sept. 21</td>
<td>Oct. 11</td>
</tr>
<tr>
<td>Assign#2</td>
<td>5%</td>
<td>Oct. 29</td>
<td>Nov. 16</td>
</tr>
<tr>
<td>Assign#3</td>
<td>5%</td>
<td>Nov. 16</td>
<td>Dec. 6</td>
</tr>
<tr>
<td>Labs</td>
<td>25%</td>
<td>Lab assessment will be based of 5 labs and the dates will be</td>
<td></td>
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</table>
Mid-Term Exam | 20% | Tuesday Oct. 16, 2018 in class - **There is no deferred Mid-Term Exam

Final Exam | 40%

- 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 Tuesday, October 16, 2018. In general, there is no differed mid-term exam. Another midterm exam may be granted to a student that 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 15 minutes after the end 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.

Exams

The final examination is for evaluation purposes only and will not be returned to students. You will be able to make arrangements with the instructor or with the department office to see your marked final examination after the final grades have been made available.

General Regulations

- **Attendance**: Students are expected to attend all lectures and lab periods. The University requires students to have a conflict-free timetable. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 1.2, Course Selection and Registration and Section 1.5, Deregistration. Requests to accommodate a missed midterm exam, lab periods, etc., because of conflicts with jobs or vacation plans will not be considered.
- **Health and Safety**: Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: http://sce.carleton.ca/courses/health-and-safety.pdf.
- **Deferred Term Work**: Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately...
informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. For more information, see the Academic Regulations of the University, Section 2.6, Deferred Term Work

- **Appeal of Grades**: The processes for dealing with questions or concerns regarding grades assigned during the term and final grades is described in the Academic Regulations of the University, Section 2.7, Informal Appeal of Grade and Section 2.8, Formal Appeal of Grade.

- **Academic Integrity**: Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: https://carleton.ca/registrar/academic-integrity/ This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

- **Academic Accommodations**: Requests for Academic Accommodation You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:
  - Pregnancy obligation
    Please contact your instructor with 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. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf
  - Religious obligation
    Please contact your instructor with 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. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf
  - Academic Accommodations for Students with Disabilities
    If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.caPMC
  - Survivors of Sexual Violence
    As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and is survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support
  - Accommodation for Student Activities
    Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with 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. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

- **Copyright on Course Materials**: The materials created for this course (including course outline, slides, posted notes, labs, project, assignments, quizzes, exams and solutions) are
intended for personal use and may not be reproduced or redistributed or posted on any web site without prior written permission from the author(s).

Additional Information

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:

Deferred Exams

1. Note that midterm deferred exam if approved will cover everything taught in class and lab up to the date of the deferred exam.

2. Note also that the Professor reserved the right to set the exams (i.e. mid term and final exams) to cover all the materials (i.e. lecture notes, books, handouts, teaching, and reference materials) examined and covered in class and during the labs.

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.

Tentative Week-By-Week Schedule

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