Course Outline

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                 Office hours: Wednesdays, 3:30 - 4:30 pm
                 Otherwise, by appointment.

Calendar Description:
Current techniques, notations, methods, processes and tools used in Requirements Engineering.
Requirements elicitation, negotiation, modeling requirements, management, validation. Skills
needed for Requirements Engineering and the many disciplines on which it draws. Requirements
analysis: domain modeling; modeling object interactions; UML modeling. Introduction to
software development processes.

Course Description and Objectives:
Software engineering is concerned with the theories, methods, and tools that are needed to
develop complex, large-scale software. It encompasses a wide range of topics, including
requirements and specification, software design, software construction (i.e., implementation),
validation and verification, software maintenance, and the management of the software process.
Every single software development process involves one or more of these topics. It is therefore
paramount to understand them all. With the Unified Modeling Language (UML) becoming the
industry, de-facto standard notation for software development (70% of IT industry uses UML),
software development is becoming more and more model-driven (or model-based), with less
manual generation of source code but more automated generation of source code (from models).
A single course is clearly incapable of covering all these topics in depth.
This course focuses on the initial part of standard software development processes, which is
referred to as requirements engineering, which is itself often decomposed into two phases,
namely requirements elicitation and requirements analysis (or modelling). The following parts of
the software development process, which are mostly about design (i.e., finding a solution to the
problem specified during requirements engineering), will be the purpose of SYSC4120.
More specifically, the three main *goals* of this course are:
  - To understand the role of requirements engineering, including requirement elicitation and
    analysis;
  - To understand the main principles that underlie these phases;
  - To master model-based software development by using the UML;
And the two main *objectives* of this course are:
  - To conduct requirement elicitation, thereby producing software requirements under the
    form of a use case model, using established principles;
  - To produce an analysis models made of consistent diagrams (class, sequence, state
    machine diagrams), following well established heuristics;

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: Tuesdays and Thursdays, from 11:30 - 13:00
>   Where: Mackenzie Building, Room: 3356

Laboratory Sessions (compulsory):
>   When: Mondays, from 10:00 - 12:00
>   Where: Architecture Building, Room: 508

Textbook:
The following textbook will be the primary reference:
>   Bernd Bruegge and Allen Dutoit, *Object-Oriented Software Engineering: Using UML, Patterns and Java*, Third Edition, Prentice-Hall 2009, ISBN 0-13-606125-7.

Although course material will draw extensively from other sources, this textbook provides an excellent basis for this course. Students are therefore encouraged to purchase it.
The course slides will be made available in PDF format on the course web site, on a weekly basis.
Important notice: Course notes are subject to changes without notice until presented in class. After being discussed in class, changes to course notes will be posted online.

Grading Scheme:
-   three assignments, each worth 8% of the final mark;
-   two (closed-book) midterm exams, each weighting 22% of the final mark;
-   a (closed-book) final exam worth 32%.

To pass the course, a student must obtain: an appropriate overall mark (D- or higher), a passing mark (D- or higher) for at least two of the three exams and get credit for at least ten labs.

Important dates:
-   Assignment 1 will be posted on Jan. 19 and due on Feb. 10.
-   Assignment 2 will be posted on Feb. 10 and due on Mar. 10.
-   Assignment 3 will be posted on Mar. 12 and due on Apr. 2.
-   The first (in-class) midterm exam is scheduled on Feb. 12.
-   The second (in-class) midterm exam is scheduled on Mar. 12.
-   The final exam will be scheduled during the April exam period.

Students with conflicts: see Academic Accommodation below.

Assignments:
Students are encouraged to discuss issues when working on assignments; however, you are expected to submit your own work for grading (assignments are individual work). There is a fine line between cooperating with your colleagues (discussing problems and ideas) and copying solutions (plagiarism). Not only plagiarism is 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.
Submission: Assignments are due at midnight of the due date and must be submitted online on cuLearn. When submitting assignments, double check that your material has indeed been submitted.
Late assignments will be graded according to the following policy: a (cumulative) 25% penalty per day (i.e., 24 hours) with a maximum of two days.

Final Exam: *Is for evaluation purposes only and will not be returned to the student.*
Students who miss the final exam may be granted permission to write a deferred examination (see the Undergraduate Calendar for regulations on deferred exams).

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: write to me 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: http://www2.carleton.ca/equity/.

Religious obligation: write to me 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: http://www2.carleton.ca/equity/.

Academic Accommodations for Students with Disabilities: The *Paul Menton Centre* 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*). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (*if applicable*) at http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/.
You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at   http://www2.carleton.ca/equity/.

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.

Health and safety:
http://www.sce.carleton.ca/courses/health-and-safety.pdf

Tentative Outline
The following is a tentative outline of the course; it might change, based on time constraints:

Week 1	Introduction to Software Engineering the nature of software, history and scope of software engineering, relationships with other fields, fundamental principles, software life cycle
Week 2	Requirement Elicitation using UML
Week 3	Producing a specification of the system that the client understands. Relationship between requirements and specifications, the uses of specifications, the qualities of specifications, the requirements
Week 4	engineering process and products.
Week 5	Object-Oriented Analysis using UML—class diagram modeling
Week 6	
Week 7	Object-Oriented Analysis using UML—sequence diagram modeling
Week 8	Object-Oriented Analysis using UML—state-base behaviour modeling
Week 9	

Week 10	Object-Oriented Analysis using UML—the process
Week 11	Producing an analysis model that the developers can unambiguously interpret. Formalizing the requirements (Requirement Elicitation) into specifications (Analysis).
Week 12	
Week 13	Other considerations

Miscellaneous:

Attendance:
Being (consistently) late in lectures and/or labs does not show professional behaviour. 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 transparencies provided on the course web site (this may depend on student participations, student questions, …), and (ii) questions during the final exam will target the understanding of lab activities as well as lab material.

Expectations:
The students are expected to invest a substantial amount of time and energy in reading the textbook and doing the assignments/lab work. Looking at the slides provided may not be enough to achieve the level of understanding required for the mid-term and final exams.