Carleton University

Department of Systems and Computer Engineering

SYSC 3100 Systems Analysis and Design Fall 2011

Course Outline

Instructor*: Samuel A. Ajila PhD, P.Eng*

[Office: MC 7038, Phone: 2673, Office Hours: Tuesday 1:30 pm to 3:0 pm]

Course Calendar Description, Objectives, and Intended Outcomes:

Creating requirements specifications prior to designing and implementing complex software systems. Software development lifecycles, role of requirements analysis; functional decomposition, dataflow modeling; database modeling, entity-relationship diagrams; finite state machines; object-oriented analysis; use cases, use case maps; project management; introduction to software design.

Precludes additional credit for **BUSI 3402** Prerequisite: **SYSC 2004** or **SYSC 2100**

Lectures three hours a week, laboratory/problem analysis two hours a week

This course is intended to develop students' abilities to model complex systems (particularly software systems) at a level of abstraction above the implementation details. Although classic software development lifecycles and classic techniques for requirements analysis and design receive some coverage, the emphasis is on developing models from an object-oriented viewpoint, using modern software development processes (iterative development and incremental development) and UML modeling languages.

What is learned from this course are fundamental to creating requirements specifications prior to designing and implementing complex software systems. The topics include:

- An introduction to Software Life Cycle Phases (with emphasis on early stages and Unified Development Process)
- Software Systems Analysis
  - Object-Oriented – detailed treatment of UML (syntax, semantics, and application)
  - Procedural – an introduction to functional decomposition especially Entity-Relationship modeling and Relational Data Model.
- An introduction to OO Software Design
- **If time permits**, we will look at an introduction to formal method with Object Constraint Language (OCL)

Prerequisite:

Students who have not satisfied the prerequisite for this course must either (a) withdraw from the course, (b) submit a prerequisite waiver to the Associate Deans' office (FED or Faculty of Science) or (c) will be deregistered from the course after the last day to register for courses in Fall term.

Recommended text:

1. Simon Bennet, John Skelton, and Ken Lunn, UML, 2nd ed., McGraw-Hill Schaum's Outlines, ISBN 0-07-710741-1, 2005. **This book is mandatory. Do not buy 1st edition – even if it is for free.**

Grading Scheme:

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

Assignments, Project and labs (2 hrs/week)	**20 marks**
1 hour 15 minutes Mid-Term (in-class closed book exam)	**25 marks**
Final Exam (closed book, 2 to 3 hours)	**55 marks**

The mid-term exam will be held during regular class hours, on Tuesday, **October 18, 2011**. You should plan [now] to be there. **There is no differed mid-term exam.** For students who miss the midterm

due to illness, **the midterm exam weight (i.e. marks) may be added to the final exam** if there is **sufficient evidence** (e.g. medical report) that the student is actually sick.

Note that late hand-in of **assignments** will be accepted with the penalty as follows:

1. 1.0 mark a day for weekdays
2. 0.65 mark a day for weekends and holidays

Note that 0.65 and 1.0 marks correspond to 0.65% and 1.0% of your grade, since every mark equals 1% of the overall grade.

Note also that late hand-in of labs (or a no show for mandatory labs) will be graded zero percent (0%)

Final Exam: *Is for the 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 **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: 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://www.carleton.ca/equity/accommodation/student_guide.htm

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://www.carleton.ca/equity/accommodation/student_guide.htm

Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that I receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam(s) in this course, please submit your request for accommodations to PMC by the deadlines published on the PMC website: http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/

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.

Tentative Week By Week Outlines

- **Weeks 1 & 2 - Basic Software Development Concepts, Object Orientation and Requirements Elicitation**
  - Introduction
  - Software lifecycles & Requirement Engineering
  - Introduction to O-O Development & Software Engineering Principles
  - Introduction to UML
  - Requirements Capture with Use case & use case diagrams
- **Weeks 3 & 4 - Introduction to Systems Analysis**
  - Defining Objects, Classes, and Interfaces
  - Defining Relationships between Classes
  - Advanced Features - Adding semantics to Class Diagrams
  - Business flows using Activity [diagrams]
- **Weeks 5, 6, & 7 - Systems Analysis and Design**
  - Introduction to objects Design using Interactions diagrams - Sequence & Communication Diagrams
  - 70 minutes in-class mid-term exam (Oct. 18, 2011)
- **Weeks 8, 9 & 10 - Refining Requirements Model and in-class exam**
  - Advanced Generalization and Inheritance Modeling
  - Moving into System Design with State-charts
  - An introduction to Entity-Relationships Modeling and Relational Data Modeling
- **Weeks 11 & 12 - Systems Design, Revision, and Conclusion**
  - Introduction to Architecture Modeling
  - Formal Method - The Object Constraint Language (OCL)
- **Week 13 – Review and more formal methods**