COM SFWR 707: Formal Specification Techniques  
—Course outline (2008-2009)—

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Office hour: To be arranged.  
Lectures: Tuesday and Friday from 1:00 PM to 2:30 PM. All lectures are in room ITB/222.

Course Description

Topics include Pre/Postconditions, refinement, state-based approaches, event based approaches, algebraic specifications, Petri nets, temporal logic, properties of programs, specification verification and validation.

Course Objective

The main objective is to introduce students to commonly used formal state-based, even-based, and algebraic techniques to specify and verify software systems. The course aims as well at fostering the development of the skills beyond the pure mathematics needed to set up and manipulate mathematical models that mimic relevant features of software systems.

Textbooks

I strongly recommend the following textbook which is available at McMaster bookstore.


Course Information on Web

At the following website you can find the latest version of the outline, the transparencies used in class, and the assignments.

http://www.cas.mcmaster.ca/~khedri/?page_id=65

Evaluation

There will be two assignments, one in-class presentation (or a midterm exam –depends on the class size–), one project, and a final exam. Also, students will be evaluated on their class participation (05% of the final grade).

The in-class presentation consists (1) of reading additional material covering formal specification languages and tools and (2) of giving in-class presentations on this material. The project and class participation can be combined together. The instructor will assign a project to each student or to a group of students (it depends on the size of the class).

The final mark is determined as follows:

\[
\text{Final\ mark} = 0.15 \ast \sum_{i=1}^{2} (\text{Assignment\ mark}_i) + 0.25 \ast \text{Mid\ term\ exam\ mark} \\
+ 0.05 \ast \text{Class\ Participation\ mark} + 0.10 \ast \text{Project\ mark} \\
+ 0.3 \ast \text{Final\ exam\ mark}
\]
• The assignments reports will be due at the beginning of the lecture on the due date. Late assignments will be marked with a late penalty of 20% per day. Graded assignments and tests will be returned during lectures.

• The instructor reserves the right to adjust the grades for an assignment, a midterm exam, or the final exam by increasing or decreasing every score by a fixed number of points.

• A remarking request of an assignment or a midterm is considered by the instructor only if it is made within the week that follows the return date of the concerned assignment or midterm.

• When the instructor remarks an assignment or an exam, all the assignment/exam questions will be remarked.

• No responsibility for loss of assignments can be assumed by the instructor.

• The final examination will be a three hours in duration.

• The use of notes and text books is permitted during the exams.

Detailed course outline

• Hoare Logic, Contracts, and Refinement
• Universal Algebra and algebraic specifications
• Cafl the Common Algebraic Specification Language
• Abstract state machines
• The event-B Modelling Method: Concepts and Case Studies
• A Methodological Guide to the CafeOBJ Logic
• Duration Calculus
• The Logic of the RAISE Specification Language
• Temporal Logic and the Specification Language TLA+
• The Typed Logic of Partial Functions and the Vienna Development Method (VDM)
• Z Logic and Its Applications
• Petri Nets
• Model Checking
• Feature Algebra

The lectures will not necessary follow the order in which the topics are presented in the detailed course outline.

References

Disabilities

Students with disabilities can receive accommodations to assist them in the completion of assignments and exams. Please contact the Centre for Student Development (http://csd.mcmaster.ca) for advice and for arranging assistance. Students are also encouraged to talk to the instructor about this issue.

Official Statements

Discrimination

“The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem that cannot be resolved by discussion among the persons concerned individuals are reminded that they should contact there Chair, the Sexual Harassment Office of the Human Rights Consultant, as soon as possible.”

Academic Integrity

“Students are reminded that they should read and comply with the Statements on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registrations and available in the Senate Office.”

“Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: ”Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at http://www.mcmaster.ca/senate/academic/ac_integrity.htm.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.”