CAS 734 Winter 2008

00 Preliminaries

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Course Elements

- Instructor: Dr. William M. Farmer
  - Office: ITB 163
  - Extension: 27039
  - E-mail: `wmfarmer@mcmaster.ca`
  - Web: `http://imps.mcmaster.ca/wmfarmer/`
  - Office hours: by appointment
- Course web site:

  `http://www.cas.mcmaster.ca/~wmfarmer/CAS-734-08/`
- Lecture schedule: MW 9:00–10:30 in ITB 225

Mission

The mission of this course is to teach students how to express and develop mathematics within a formal logic. By the end of the course the student should:

1. Understand what formalized mathematics is and what are the costs and benefits of employing formalized mathematics, particularly in software development.
2. Be able to express mathematical models as axiomatic theories in higher-order logic and set theory.
3. Be able to develop and analyze axiomatic theories using the IMPS Interactive Mathematics Proof System and at least one other interactive theorem proving system.

Mission (cont.)

4. Have a suitable background for using formalized mathematics in the specification and analysis of complex systems such as software systems.
5. Be familiar with the major challenges that face researchers who are trying to make formalized mathematics into a practical discipline.

Work Plan

- Lectures in class
- Exercises outside of class
  - Most will require the use of an interactive theorem proving system
- Student presentations in class
  - Each should be about 15 minutes long
- Students are required to learn how to use at least two interactive theorem proving systems, one being the IMPS Interactive Mathematics Proof System
- No tests or exams

Marking Scheme

Exercises	75%
Presentations	25%
Total	**100%**

Policy Statements

1. Academic dishonesty will not be tolerated!
2. Significant study and reading outside of class is required.
3. Students are expected to regularly attend the lectures and to ask questions.
4. Exercises that are submitted late and presentations that are given late will be penalized 2% for each late day. For example, if an exercise was given a mark of 80 but was turned in one week late, the actual mark will be $80 - 7 \cdot 2 = 66$.

Policy Statements (cont.)

5. 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 their Department Chair and the Human Rights and Equity Services (HRES) office as soon as possible.
6. Suggestions on how to improve the course and the instructor's teaching methods are always welcomed.

Tentative Schedule

00 Preliminaries

01 What is Formalized Mathematics?

02 Review of Mathematical Logic

03 Theory Development Techniques

04 The IMPS Interactive Mathematical Proof System

05 Other Interactive Theorem Proving Systems

06 Practice-Oriented Logics

07 The Little Theories Method