CAS 706 — Programming Languages

3 September 2010

Outline

Instructor: Dr. Wolfram **Kahl** Room: ITB-245
Department of Computing and Software
McMaster University E-Mail: kahl@mcmaster.ca

Calendar Description

Design, definition and implementation of programming languages. Programming language paradigms; syntax, attribute grammars, typing; axiomatic, operational and denotational semantics; correctness proofs; implementation techniques, virtual machines; design and implementation of Domain-Specific Languages. code generation and optimization.

Course Pages: http://www.cas.mcmaster.ca/~kahl/CAS706/2010/

This is where you find further information, announcements, and useful links. Electronic versions of the assignment sheets will also be kept there.

It is the student's responsibility to be aware of the information in the course Web pages, and to check regularly for announcements.

Literature: Will be listed on the course page.

Schedule: Tuesday and Thursday 15:00-17:00; exceptions will be announced.

Grading:

- **Assignments:** 30% (details to be announced)
- **Presentation:** 20% (details to be announced)
- **Midterm:** 20% if better than Final, otherwise 10%
- **Final Exam:** 30% or 40%

All examinations in this course will be **Closed Book**. That is, no written or printed material nor a calculator may be used during the examinations.

The instructor reserves the right to conduct any deferred exams orally.

Topics

The major topics are most likely to be presented in an interleaved manner that allows applying theory in practice with less delay.

Some topics will be covered by student presentations; additional topics may be added as time permits.

- Programming Language Paradigms
  - Programming in Selected Programming Languages
- Programming Language Design Goals and Description Tools

  - Syntax description beyond context-free grammars
  - Typing Systems
  - Attribute Grammars
- Axiomatic Semantics
  - Principles, Use, and Limitations of Hoare Logic
- Operational Semantics
  - of imperative languages
  - of functional languages
  - of logic languages
  - of hybrid languages
- Denotational Semantics
  - of functional languages
  - of imperative languages
- Programming Languages and Correctness
  - Proving consistency of axiomatic, operational and denotational semantics of the same language
  - Program correctness proofs using different semantics

Course Adaptation

The instructor and university reserve the right to modify elements of the course during the term.

The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

Academic Ethics

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour 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 types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity.

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 unauthorised aids in tests and examinations.***

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 the Department Chair, the Sexual Harassment Office or the Human Rights Consultant, as soon as possible.