**Department of Computer Science**

176 Thorvaldson Building
110 Science Place, Saskatoon, SK, S7N 5C9, Canada
Telephine: (306) 966-4886, Facimile: (306) 966-4884

CMPT 340-01
Winter 2016-2017

**UNIVERSITY OF SASKATCHEWAN**

# Course Syllabus

## CMPT 340: Programming Language Paradigms

**Catalogue Description**

A comparative study of programming languages and paradigms.

- Introduction to functional programming languages, such as Haskell. Topics include:

  - Recursion
  - Higher-Order Functions
  - Polymorphic Types
  - Lazy Evaluation

- Introduction to concurrent programming languages and paradigms. Topics (tentatively) include:

  - Processes, Concurrency and Communication
  - Asynchronous Message Passing; Actors
  - Synchronous Message Passing; CCS
  - Programming Paradigms; Manager / Workers Paradigm
  - Coordination Languages and Models; Linda

- Introduction to logic programming languages, such as Prolog. Topics include:

  - Unification
  - Backtracking
  - Resolution

- An introduction to interpreters, parsers, program transformations, and semantic models.

| | |
|---|---|
| **Prerequisite(s):** | CMPT 214, CMPT 260 and CMPT 270 required. CMPT 215 or EE 331 recommended. |
| **Class Time and Location:** | Lecture: 11:30 pm - 2:20 pm MWF, Arts 146; Tutorials: T02: Friday 12:30 pm - 1:20 pm Thorvaldson Building S320; T04: Thursday 9:00 am - 9:50 am Thorvaldson Building S320; T06: Wednesday 3:30 pm - 4:20 pm Thorvaldson Building S320. |

## Instructor Information

| | |
|---|---|
| **Instructor** | Prof. Nadeem Jamali |
| **Contact:** | Email: jamali@cs.usask.ca, |
| | Phone: 306-966-2579 |
| **Office Hours:** | Location: Thorvaldson 281.6, |
| | Hours: TBA |

## Course Objectives

- An in-depth introduction of the foundations and use of programming paradigms beyond imperative and object-oriented programming.

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## Student Evaluation

### Grading Scheme

| Assignments | 55% |
|---|---|
| Midterm Exam | 15% |
| Final Exam | 30% |
| Total | 100% |

### Criteria That Must Be Met To Pass

- Up to seven programming assignments will be assigned, which will be due roughly every two weeks.

- Midterm and cumulative marks will be scaled.

### Tentative Schedule

| Activity | Assigned | Due |
|---|---|---|
| Assignment 1 | January 17 | January 31 |
| Assignment 2 | January 31 | February 14 |
| Assignment 3 | February 14 | March 7 |
| Midterm Exam | February 27 | |
| Assignment 4 | March 7 | March 23 |
| Assignment 5 | March 23 | April 6 |

### Attendence Expectation

Students will be expected to know all information passed on during lectures and tutorials and through the webpage, Moodle and email. If they miss a lecture or tutorial, they are responsible for acquiring material covered in the session.

### Final Exam Scheduling

The Registrar schedules all final examinations, including deferred and supplemental examinations. Students are advised not to make travel arrangements for the exam period until the official exam schedule has been posted.
**Note: All students must be properly registered in order to attend lectures and receive credit for this course.**

## Textbook Information

### Recommended Texts

- W. F. Clocksin and C. Mellish, "Programming in PROLOG: Using the ISO Standard (5th edition)," Springer-Verlag 2003.

- Graham Hutton, "Programming in Haskell," Cambridge University Press, Second Edition, 2016.

- Gregory R. Andrews, "Foundations of Multithreaded, Parallel and Distributed Programming," Adison Wesley, 2000.

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## Lecture Schedule

- Tentative schedule of topics to be covered:

  | | |
  |---|---|
  | Lecture 1 | Overview |
  | Lectures 2 – 17 | Functional Programming |
  | Lectures 18 – 22 | Concurrent Programming |
  | Lectures 23 – 36 | Logic Programming |
  | Lecture 37 | Review |

## Course Overview

- The course aims to familiarize students with different programming paradigms with the goals of (1) teaching them about specific new paradigms and increasing their curiosity about different paradigms and underlying theoretical foundations, and (2) increasing their comfort level in learning about and using paradigms and languages best suited to different types of problems.

- Additional reading materials may be identified over the course of the term, such as for the programming languages used.

- The course focuses on programming paradigms rather than specific programming languages. Although there will be tutorials to provide some help with the programming languages, students will be expected to self-learn necessary additional features of the languages used for completing their assignments.

## Policies

### Recording of Lectures

Lectures may not be recorded in audio or video without prior written permission from instructor.

### Late Assignments

- Assignments must be turned in at the times and dates and locations they are due, unless you have received permission in advance for an extension.

### Missed Assignments

Students should submit early versions of their programming solutions frequently to avoid the possibility of missing a deadline. Students will receive zero marks for assignments missed without prior permission from the instructor. If there is a compelling reason why seeking prior permission is not possible, the student should contact the instructor at the earliest opportunity for consideration of alternative arrangements. The instructor will judge whether the reason is compelling.

### Missed Examinations

1. Students who miss an exam should contact the instructor as soon as possible. If it is known in advance that an exam will be missed, the instructor should be contacted before the exam.

2. "A student who is absent from a final examination due to medical, compassionate, or other valid reasons, may apply to the College of Arts and Science Undergraduate StudentŠs Office for a deferred exam. Application must be made within three business days of the missed examination and be accompanied by supporting documents."

   (http://artsandscience.usask.ca/undergraduate/advising/strategies.php)

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## Incomplete Course Work and Final Grades

"When a student has not completed the required course work, which includes any assignment or examination including the final examination, by the time of submission of the final grades, they may be granted an extension to permit completion of an assignment, or granted a deferred examination in the case of absence from a final examination.

Extensions past the final examination date for the completion of assignments must be approved by the Department Head, or Dean in non-departmentalized Colleges, and may exceed thirty days only in unusual circumstances. The student must apply to the instructor for such an extension and furnish satisfactory reasons for the deficiency. Deferred final examinations are granted as per College policy.

In the interim, the instructor will submit a computed percentile grade for the class which factors in the incomplete coursework as a zero, along with a grade comment of INF (Incomplete Failure) if a failing grade.

**In the case where the student has a passing percentile grade but the instructor has indicated in the course outline that failure to complete the required coursework will result in failure in the course, a final grade of 49% will be submitted along with a grade comment of INF (Incomplete Failure).**

If an extension is granted and the required assignment is submitted within the allotted time, or if a deferred examination is granted and written in the case of absence from the final examination, the instructor will submit a revised assigned final percentage grade. The grade change will replace the previous grade and any grade comment of INF (Incomplete Failure) will be removed.

A student can pass a course on the basis of work completed in the course provided that any incomplete course work has not been deemed mandatory by the instructor in the course outline and/or by College regulations for achieving a passing grade." (http://policies.usask.ca/policies/academic-affairs/academic-courses.php)

For policies governing examinations and grading, students are referred to the Assessment of Students section of the University policy "Academic courses: class delivery, examinations, and assessment of student learning" (http://policies.usask.ca/policies/academic-affairs/academic-courses.php)

## Academic Honesty

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals subsection of the University Secretary Website and avoid any behaviour that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct,
http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf,
as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals,
http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf.

Academic honesty is also defined and described in the Department of Computer Science statement on Academic Honesty:
http://www.cs.usask.ca/students/academic-honesty/index.php.

For more information on what academic integrity means for students see the Student Conduct & Appeals subsection of the University Secretary Website at:
http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf

## Examinations with Disability Services for Students (DSS)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check http://www.students.usask.ca/disability/, or contact DSS at 966-7273 or dss@usask.ca.

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Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.