

CSI 3120 Programming Language Concepts

(3 units)

Course Components: Lecture, Laboratory, Tutorial

Fall 2020 Course Outline

Design and evaluation criteria for programming languages. Introduction to syntactic and semantic description of programming languages. Basics of programming language implementation. Scripting languages. A comparison of design choices across programming paradigms: data objects, data types, control structures, sub-programs. Basics of concurrency. Prerequisites: CSI2101, CSI2120.

Course Objectives (see Chapter 1 of the Mitchell textbook):

- To understand the *design space* of programming languages, which includes concepts and constructs from past programming languages as well as those that may be used more widely in the future. Also, to understand some of the major conflicts and trade-offs between language features, including implementation costs.
- To develop a better understanding of the languages we currently use by comparing them with other languages.
- To understand the programming techniques associated with various language features. More generally, to study conceptual frameworks for problem solving, software construction, and development via the study of programming languages.
- To revisit functional, imperative, and object-oriented features via the use of the OCaml programming language.

Professor:

Dr. Amy Felty
afelty@uottawa.ca

Lectures:

- Lectures will be online and synchronous and delivered via Adobe Connect.
- Wednesday 10:00–11:20
- Friday, 8:30–9:50

Laboratory/Tutorial

- LAB Group A01: Monday, 17:30–18:50
- LAB Group A02: Tuesday, 13:00–14:20
- LAB Group A03: Friday, 10:00–11:20
- TUT Group A05: Thursday, 17:30–18:50
- TUT Group A04: Friday, 16:00–17:20

Office Hours: Wednesday 15:00–17:00

Required Textbooks:

- *Concepts in Programming Languages*, John C. Mitchell, Cambridge University Press, 2003. An online copy is available for purchase (see the course web site). It may also be available at the campus store.
- *Real World OCaml*, Yaron Minsky, Anil Madhavapeddy, and Jason Hickey, O'Reilly, 2014. Available on the web.

Evaluation:

Assignments	30% (approximately 6 or 7, must be done individually)
Labs	10% (approximately 9 or 10, must be done individually)
Midterm 1	15%
Midterm 2	15%
Final Exam	30%

Attendance, Participation, and other Requirements:

- Attendance at lectures is mandatory. As per academic regulations of the faculty, students who do not attend 80% of the lectures will not be allowed to write the final examination.
- All components of the course (i.e., labs, assignments, etc.) must be fulfilled; otherwise students may receive an EIN as a final mark (equivalent to an F). This is also valid for a student who is taking the course for the second time.
- If you miss a lecture, you must make up the material. Lectures will be recorded and posted on Brightspace.
- If you miss a lab, you cannot get credit for it, but you must still make up the material. Lab material will be posted in Brightspace. Labs will *not* be recorded.
- You must meet the following minimum requirements in order to avoid an EIN as mentioned above:
 - You must participate in at least 5 labs.
 - You must get at least 30% on the assignment component of the course.
 - You must get at least 30% on the exam component of the course.

Course Information: Course information will be available through Brightspace. The information there includes a link to the course web site:

<http://www.eecs.uottawa.ca/~afelty/csi3120/>

Course Outline:

- An introduction to programming language concepts
- An introduction to OCaml
- Types and functional programming
- Inductive data types
- Polymorphic higher-order programming
- Data abstraction and modularity
- Mutable data and imperative programming
- Object-oriented programming
- Syntax and semantics
- Scope, procedures, and storage management
- Control in sequential languages
- Concurrent and distributed programming
- Combinators, pipelines, and scripting
- Semantics revisited

Reminders:

- Information on academic fraud can be found at these links:
<https://www.uottawa.ca/vice-president-academic/academic-regulations-explained/academic-fraud>
<https://www.uottawa.ca/vice-president-academic/academic-integrity/resources-students/frequently-asked-questions-faq>
- Students are to become familiar with the Faculty of Engineering rules and regulations; you may refer to them if you happen to miss an exam. These are within the University of Ottawas regulations sections 9.4, 9.5, and 9.6, which define conduct during an examination, and related matters:
<https://www.uottawa.ca/administration-and-governance/policies-and-regulations>
- Library resources for engineering students can be found at the following link: <http://biblio.uottawa.ca/en/research-help/research-guides-and-librarians>.
- If necessary, the instructor will contact students through their official University of Ottawas e-mail address (username@uottawa.ca). If you are using a personal e-mail address, please go to the university mail management web site to set a forwarding address (<https://web.uottawa.ca/cgi-bin/mailadmin/main.pl>). You are responsible for ensuring you are receiving official course information in an efficient and timely manner.
- The University of Ottawa provides, upon request, appropriate academic adjustments for students who have learning disabilities, health, psychiatric or physical conditions. For more information, please contact Access Service (<http://www.sass.uottawa.ca/access/>).
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