COSC 4P41 – Functional Programming

Course Information

Course Number: COSC 4P41
Term/Year/Duration: Winter 2025 D3
Course Title: Functional Programming
Course Fees: None

Instructor Information

Instructor Name: Michael Winter
Email: mwinter@brocku.ca
Office Locations: MCCJ323
Contact: by email or during office hours, Mon & Wed, 01:00pm-03:00pm
Teaching Assistants: tba

Times and Locations

- *Lecture:* *Mon & Wed, 05:30pm-07:00pm, TH246*
- *Labs:* *Lab 1: Fri, 04:00pm-06:00pm, MCJ310*
  Lab 2: Mon, 10:00am-12:00pm, MCJ310
  Lab 3: Wed. 11:00am-01:00pm, MCJ310

Note: Classes at Brock University end ten minutes ahead of the hour or half hour to facilitate transfer time.

Optional language regarding synchronous lecture recordings:

A Student may make or share an audio or video recording of a lecture, presentation, or lesson, ***only with the permission of the instructor.***

Course Calendar Description

Introduction to functional programming using the languages Haskell. Topics include all data types, type inference, pattern-matching, recursion, polymorphism, higher-order functions, lazy vs eager evaluation, modules and monads.

Learning Outcomes:

- Understand the differences between programming paradigms as well as their strengths and weaknesses in order to identify suitable programming languages for a particular task's needs.
- Apply key techniques of the functional programming paradigm to solve programming problems.
- Identify and exploit patterns in programs to design and implement programming abstractions.
- Prove simple properties about functionally pure computer programs.
- Use different evaluation strategies to evaluate programs.

Recommended Readings or Texts

Haskell, The Craft of Functional Programming, 3rd edition, S. Thompson, Addison - Wesley (2011), ISBN 0-201-88295-7

Course Communications

All information about the course can be found on the course web page at:

https://www.cosc.brocku.ca/~mwinter/Courses/4P41/

All other communication is via Brock email.

Assessment Components and Due Dates

Table 1 Assessment Components

Assessment Component	**Grade Weight**
Lab tests (3 tests)	3 * 20% = 60%
Final exam	40%
Total	100%

Important dates

The most recent listing of Important Dates for all durations is at https://brocku.ca/important-dates/all/

First day of classes: January 05, 2026

Last day of lectures: April 03, 2026

Last day of exams: April 22, 2026

Deadline for withdrawal without academic penalty: March 04, 2026

Relationship between attendance and grades:

Students are expected to attend all classes, labs and tutorials.

Academic Policies

Academic Integrity

Statement for undergraduate courses

Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section VII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the Undergraduate Calendar to view a fuller description of prohibited actions, and the procedures and penalties. Information on what constitutes academic integrity is available at Brock University Academic Integrity Website.

Penalties for Academic Misconduct in the Faculty of Mathematics and Science

The following are penalties usually imposed in academic misconduct cases in FMS. Please be aware that the Associate Dean, Undergraduate Programs, may assign different penalties than those listed here, depending on the details of individual cases. When the offense involves misconduct on a final exam, the penalties are steeper.

Course work, including mid-term tests

First academic integrity offence: Zero grade on the lab test.

Second academic integrity offence: Zero grade on the lab test, zero grade in course OR 4-month suspension.

Third or additional academic integrity offence: Zero grade in course, 1-year suspension, permanent removal from major program.

Final exams:

First academic integrity offence: Zero grade in course.

Second academic integrity offence: Zero grade in course, 4-month suspension

Third or additional academic integrity offence: Zero grade in course, 1-year suspension, permanent removal from major program.

Intellectual Property Notice

All slides, presentations, handouts, tests, exams, and other course materials created by the instructor in this course are the intellectual property of the instructor. A student who publicly posts or sells an instructor's work, without the instructor's express consent, may be charged with misconduct under Brock's Academic Integrity Policy and/or Code of Conduct, and may also face adverse legal consequences for infringement of intellectual property rights.

Accommodations

The University is committed to fostering an inclusive and supportive environment for all students and will adhere to the Human Rights principles that ensure respect for dignity, individualized accommodation, inclusion and full participation. The University provides a wide range of resources to assist students, as follows:

a) If you require academic accommodation because of a disability or an ongoing health or mental health condition, please contact Student Accessibility Services at askSAS@brocku.ca or 905 688 5550 ext. 3240.

b) Medical Self-Declaration Forms (brief absence up to 72 hours)

In the case of a short-term medical circumstance, if a student wishes to seek an academic consideration, please use the Medical Self-Declaration Form. The request is to be made in good faith by the student requesting the academic consideration due to a short-term condition that impacts their academic activities (e.g., participation in academic classes, delay in assignments, etc.).

The period of this short-term medical condition for academic consideration must fall within a 72-hour (3 day) period. The form must be submitted to the instructor either during your brief absence or if you are too unwell, within 24 hours of the end of your 3 day brief absence.

Medical Verification Form (extended duration)
In cases where a student requests academic consideration due to a medical circumstance that exceeds 72 hours (three days) and will impact their academic activities (e.g., participation in academic classes, delay in assignments, etc.), or in the case of a final exam deferral, the medical verification form must be signed by the student and the health professional as per process set out in the Faculty Handbook III:9.4.1.

c) If you are experiencing mental health concerns, contact the Student Wellness and Accessibility Centre. *Good2Talk* is a service specifically for post-secondary students, available 24/7, 365 days a year, and provides anonymous assistance: Good 2 Talk or call **1-866-925-5454**. For information on wellness, coping and resiliency, visit: Brock University (Mental Health)

d) If you require academic accommodation on religious grounds, you should make a formal, written request to your instructor(s) for alternative dates and/or means of satisfying requirements. Such requests should be made during the first two weeks of any given academic term, or as soon as possible after a need for accommodation is known to exist.

e) If you have been affected by sexual violence, the Human Rights & Equity Office offers support, information, reasonable accommodations, and resources through the Sexual Violence Support & Education Coordinator. For information on sexual violence, visit Brock's Sexual Assault and Harassment Policy or contact the Sexual Violence Support & Response Coordinator at humanrights@brocku.ca or 905 688 5550 ext. 4387.

f) If you have experienced discrimination or harassment on any of the above grounds, including racial, gender or other forms of discrimination, contact the Human Rights and Equity Office at humanrights@brocku.ca.

Sequence and Dates of Topics and Readings

Below is a list of dates of topics with associated readings and other relevant information. This list is subject to change based on class discussions.

Table 2 Sequence of Dates of Topics and Readings

Week	**Date**	**Topic**
1	Jan 06/08	Introduction to Functional Programming, **No lab this week**
2	Jan 13/15	Recursion and Data Types
3	Jan 20/22	Lists
4	Jan 27/29	Patterns of Computation and Functions as Values, **Test 1**
5	Feb 03/05	Overloading, Type Classes and Type Checking
6	Feb 10/12	Algebraic Types, **Test 2**
7*	Feb 24/26	Abstract Data Types
8	Mar 03/05	Lazy Evaluation
9	Mar 10/12	Programming with Actions, **Test 3**

10	Mar 17/19	Reasoning about Programs
11	Mar 24/26	Reasoning about Programs II
12	Mar 31/Apr 02	Language extensions, Review, **No lab this week**

* Feb 16-20 is Reading Week.