1 Preliminaries

1.1 Course Description

This course will cover the implementations of compilers – programs that transform source programs into executable formats. This will include understanding syntax, error-handling, and code generation. Throughout the course, we will implement increasingly sophisticated compilers to learn how different language features are compiled, and we will think through the design challenges that each language feature introduces. In addition, we will discuss garbage collection, compiler optimizations and other advanced topics.

1.2 Prerequisites

The prerequisites for this course are CMPU-240 and CMPU-203. CMPU-241 and CMPU-224 are recommended.

1.3 Learning Environment

This course will consist of lectures during which we will implement a compiler. Lectures will have synchronous and asynchronous participation options. You will be responsible for all information presented in lecture.

2 Course Content

2.1 Learning Objectives

Upon successful completion of this course you should be able to:

1. Identify the different phases of compilation.
2. Analyze how language design choices affect compiler implementation.
3. Implement compilers for different language features.
4. Describe algorithms involved in compilation.
5. Explain compiler optimizations and their tradeoffs.
2.2 Textbook

There is no required textbook for this course. As a reference, I recommend Modern Compiler Implementation in ML (Appel. 2004).

3 Assignments

This course will include programming assignments (which can be completed in pairs), and a final. Homework assignments will involve implementing increasingly complicated compilers using the OCaml programming language. Programming assignments will be evaluated based on correctness and good programming style. The final will be held online during finals period.

<table>
<thead>
<tr>
<th>Category</th>
<th>Weight</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>75%</td>
<td>5 assignments, averaged</td>
</tr>
<tr>
<td>Final</td>
<td>25%</td>
<td>Online, during finals period</td>
</tr>
</tbody>
</table>

4 Policies

4.1 Late Policy

Each group is allotted three late days for homework assignments. Each late day extends the deadline of a homework assignment by 24 hours. You may use one late day on three homework assignments, or three late days on one homework assignment, etc. Please email me before the original deadline letting me know that you plan to use a late day. If a group runs out of late days, late assignments will incur a penalty of 20% for each day past the deadline. Homework extensions and makeup exams will be granted only in exceptional circumstances (e.g., due to illness or personal/family emergencies). I will likely require confirmation from the Dean of Studies.

4.2 Collaboration and Academic Integrity

In this course, you will have the option of working with a partner for the programming assignments. You are welcome to discuss the programming assignments with other groups, but you are not permitted to look at another group’s code. You are welcome to verbally help other groups debug their code, but you must do so without looking at it. If you use an external source for your homework, you must cite it. I do not allow solutions to programming assignments from this course to be posted publicly (e.g., to Bitbucket or GitHub). I encourage every student to familiarize themselves with the CMPU department’s academic integrity policy: https://www.cs.vassar.edu/integrity.

4.3 Accessibility and Educational Opportunity

Academic accommodations are available for students registered with the Office for Accessibility and Educational Opportunity. Students in need of ADA/504 accommodations should
schedule an appointment with the professor early in the semester to arrange for said accommodations.

### 4.4 Learning Environment

Vassar College is committed to providing a safe and respectful learning environment for all students. An environment free of all forms of discrimination and harassment, including sexual assault, domestic violence, dating violence, and stalking. Vassar College has staff members trained to support students in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more:

- Counseling Service (counselingservice.vassar.edu, 845-437-5700)
- Health Service (healthservice.vassar.edu, 845-437-5800)
- SAVP (Sexual Assault and Violence Prevention, savp.vassar.edu, 845-437-7863)
- SART (Sexual Assault Response Team, available 24/7 by calling the CRC at 845-437-7333)

The SAVP website and the Title IX section of the EOAA website (eoaa.vassar.edu/title-ix/) have more information, as well as links to both on- and off-campus resources.