MEMORIAL UNIVERSITY

Faculty of Engineering and Applied Science

Course Outline
ENGI 1020

Winter 2023–24

Engineering 1020: Introduction to Programming

Instructor	Jonathan Anderson CSF-4123 jonathan.anderson@mun.ca	Alice Faisal (Lab Instructor) CSF-2111 afaisal@mun.ca
Office Hours	Wed 16:00–17:00	
Website	https://engi1020.ca	
Communication	Please email me using my @mun.ca address, as I check Brightspace/D2L/online.mun.ca infrequently.	
Calendar	**Engineering 1020: Introduction to Programming** is is an introduction to algorithmic problem solving techniques and computer programming, including basic program control structures (sequence, call, branch, loop) and data representations, functional decomposition, and design by contract. Exercises and examples are drawn from a variety of engineering disciplines and are implemented using a standard modern programming language.	
Schedule	Lecture Lab	MWF 11:00–11:50 T 11:00–12:50 (S2), R 09:00–11:00 (S3) F 14:00–15:50 (S4), T 09:00–11:00 (S5)	EN-2006 CSF-2112
Credit value	3 credit-hours		
Textbook	None, but you will be required to purchase Top Hat and the Grove Beginner Kit (e.g., from the Bookstore)		
Reference	*Introduction to Computation and Programming Using Python*, Guttag, 2nd Ed. (2016) or 3rd Ed. (2021).		
Graduate Attributes	**KB:** A Knowledge Base for Engineering, **PA:** Problem Analysis, **Des:** Design,		

1. Assessment

Your progression through Engineering 1020 will be assessed both individually and in small groups. To pass Engineering 1020, **you must pass the exam portion of the course**, and **you must complete all labs** (late penalty: 30% per day). Exams will be closed-book: students may not bring written materials or electronic devices (including calculators or phones) to their seats.

Assignments (6)	**12%**
Individual work	
Labs (6)	**12%**
Labs 0–3: individual work	
Labs 4–6: completed with a partner	
Project	**6%**
Completed with a partner	
Participation	**6%**
Top Hat (collaboration optional)	
Midterm exams (2)	**24%**
Midterm 1 (Feb 13 or 15)	12%
Midterm 2 (Mar 11 or 12)	12%
Final exam	**40%**

```python
def final_grade(grades):
    """ Compute final grade in ENGI 1020 based on term and exam grades."""

    # Compute totals for "term work" and "exam" portions of the course.
    term_weights = {'assignments': 12,
                    'labs': 12,
                    'project': 6,
                    'participation': 6}

    exam_weights = {'midterms': 24,
                    'exam': 40}

    term = sum([grades[name]*weight for name,weight in term_weights.items()])
    exams = sum([grades[name]*weight for name,weight in exam_weights.items()])

    # Compute "exam portion" as a percentage
    exam_percentage = exams / 64

    # Apply "you must pass the exam portion of the course" rule:
    if exam_percentage < 50:
        return exam_percentage
    else:
        return exams + term
```

2. Course outcomes and graduate attributes

This course will give you an introduction to the fundamentals of programming. We will use the Python programming language, but we will prepare you to program in any imperative language. After successfully completing this course, you should be able to:

Learning outcome	Attr-Prof[1]	Assessment
specify engineering processes using propositional logic	KB-I, PA-I	assignments, labs, exams
recognize the pervasiveness of computing in engineered systems and explain its systemic impacts on technical and social systems	KB-I, Impacts-I	exams
explain how computers represent values and perform computations	KB-I	assignments, exams
choose appropriate data types to solve mathematical and engineering problems, e.g., primitive types, arrays, matrices and object types	KB–I, PA-I, Des-I	assignments, labs, exams
analyze existing software and explain how it works or why it does not	KB–I, PA-I	assignments, exams
construct solutions to specified problems using imperative programming constructs (assignment, conditions, loops and function calls)	PA–I, D–I	assignments, labs, exams
design solutions to engineering problems though top-down procedural decomposition	PA–I, Des–I	assignments, labs, exams

3. Major Topics

We will introduce the following programming topics in lectures and practice applying them in exercises, in-class participation, assignments and labs. In the lab, we will use the Grove kits that are available for purchase at the University bookstore. This will give you an opportunity to translate abstract programming knowledge from a computer to a physical system that can interact with the outside world. You may even find it to be fun!

Computation	Logic, Expressions, Variables, Functions
Flow control	Conditionals, Loops, Iteration, Ranges
Data structures	Lists, Arrays, Tuples, Dictionaries
Program structure	Scripts, Modules, Objects, Methods
External interaction	Files, Packages, Web requests (maybe)
Number representation	Integers, Real numbers

4. EO Student Success Centre

The EO Student Success Centre (EN 3076) is open for all EO students, Monday–Saturday. Tutors will be available to answer any questions students may have. The schedule will be circulated in the second week of classes.

5. Supplemental Instruction

Supplemental Instruction (SI) is meant to help you develop your minds into critical thinkers. During the sessions, the SI Leader (`Riyana Afroze <rafroze@mun.ca>`, who just completed Term 3 Mechatronics) will not be a tutor and will not teach or re-state

[1]Each course outcomes is linked to a Graduate Attribute, which is an overarching expectation for engineers who graduate from our program. For example, every graduate is expected to have a discipline-specific base of fundamental knowledge (attribute "KB", *Knowledge Base for Engineering*) and the ability to choose and use appropriate tools to solve Engineering problems (attribute "Tools"). More details about the twelve Graduate Attributes, as well as the levels at which they are taught and assessed (*I: Introduced*, *D: Developed* and *A: Applied*) can be found at `https://www.mun.ca/engineering/media/production/memorial/academic/faculty-of-engineering/faculty-of-engineering-and-applied-science/media-library/facultystaff/forms/Graduate-Attributes.pdf`.

lecture material. Instead, they will develop problem-solving and review sessions where students actively solve problems, discuss and work in groups, and reflect. The main focus of the sessions is to better understand concepts taught in the lectures.

There will be two SI sessions per week, starting from the second week of classes. Emails and social media posts will be sent before each session as a reminder. The schedule will be also posted at:

`https://www.mun.ca/engineering/undergraduate/engineering-one/supplemental-instruction`

6. Academic Integrity and Professional Conduct

Students are expected to conduct themselves in all aspects of the course at the highest level of academic integrity. Any student found to commit academic misconduct will be dealt with according to the Faculty and University practices. More information is available at `http://www.mun.ca/engineering/undergrad/academicintegrity.php`. Students are encouraged to consult the `Faculty of Engineering and Applied Science Student Code of Conduct` and `Memorial University's Code of Student Conduct`.

7. Inclusion and Equity

Students who require accommodations are encouraged to contact the `Glenn Roy Blundon Centre`. The mission of the Blundon Centre is to provide and co-ordinate programs and services that enable students with disabilities to maximize their educational potential and to increase awareness of inclusive values among all members of the university community.

The university experience is enriched by the diversity of viewpoints, values, and backgrounds that each class participant possesses. In order for this course to encourage as much insightful and comprehensive discussion among class participants as possible, there is an expectation that dialogue will be collegial and respectful across disciplinary, cultural, and personal boundaries.

8. Student Assistance

Student Affairs and Services offers help and support in a variety of areas, both academic and personal. More information can be found at `http://www.mun.ca/student`.