Syllabus

CS 105 Introduction to Computer Programming 1
Fall 2019 Course Outline

Last revised: Aug 31, 2019

About the Course

- **LEARN Site** [https://learn.uwaterloo.ca/d2l/home/43372](https://learn.uwaterloo.ca/d2l/home/43372)
  For announcements, course content, lab and assignment submissions, grades

- **LEARN Discussion Boards**
  for questions and clarifications about labs, assignments, and course content.

- **Public Website** [www.student.cs.uwaterloo.ca/~cs105](http://www.student.cs.uwaterloo.ca/~cs105)
  for general information about the course (not term-specific)

Note that any term-specific content of this document is decided tentatively at the beginning of the term and is subject to change. See the course LEARN site for current information.

Philosophy

CS 105 is designed to teach the fundamentals of computer programming through interactive visual media. In other words, rather than writing computer programs to manipulate symbolic data like numbers and text, this course emphasizes computer programs to generate and manipulate interactive visual media. This approach is well suited to visual thinkers and creative individuals, but these skills are not a requirement.

Since this course teaches universal programming concepts and programming methodologies, students can apply course knowledge to any type of problem or programming language. More generally, by learning to program, students will learn to think algorithmically: this means thinking in a methodical way to solve problems and accomplish tasks.

The course material does not require any prior computer programming experience or university-level mathematics. This course is primarily designed for students from the arts, social sciences, and sciences who are interested in computer programming, but are not planning to pursue a Computer Science degree.

Objectives

This course teaches computer programming concepts and methodologies using an imperative language for generating interactive visual media.

Intended Audience

CS 105 is intended for students who are familiar with the use of a computer (file management, web browsing, etc.) but have little or no experience with programming.
Related Courses

- Prerequisites: None
- Antirequisites: CS135, CS136
- Successor: CS 106

Resources

Hardware and Software

All course material, assignments, and labs are based on JavaScript using Processing P5.js. Processing P5.js is free and open source and compatible with browsers running on OSX, Windows, and Linux.

Student labs are equipped with Macintosh OSX computers.

Textbook

No required textbook, but there is a recommended textbook:


Lecture Handouts

The lecture handouts contain the text and images of the presentations as prepared in advance. The handouts do not contain everything that the instructor will say, or write on the blackboard, or demonstrate on a computer during the course of the lecture. Instructors may also add their own material. The purpose of the handouts is to relieve students from having to copy everything down, so that they can take additional notes covering what is not in the handouts.

Reading handouts is not an adequate substitute for attending lecture. If you need to miss a lecture, you should contact a classmate who was present and catch up promptly. Presentations may also change slightly at the last minute, and timings are approximate.

Lecture Handouts are typically available on LEARN 24 hours before lecture.

Guides

The following guides are available on LEARN:

- CS105 Course Survival: advice on how to do well in CS105 and avoid common pitfalls.
- CS105 Code Style Guide: specifies how lab and assignment code should be formatted, commented, and advice for naming conventions and structuring.

Communication

Discussion Boards

Discussion Boards should be used for all questions and clarifications about labs, assignments, and course content. If you feel you need to, Discussion Boards allow private posts that are
viewable by only the instructors and TAs. However, whenever possible make a public post so others can benefit from your question and answers.

Email

Please contact the appropriate course staff.

Remember to always send email using your uwaterloo.ca email address.

- cs105@uwaterloo.ca (Instructional Support Assistant)
  - assignment and lab remark requests

- bmzister@uwaterloo.ca (Instructional Support Coordinator)
  - technical issues with course websites, lab machines, etc.
  - technical issues with clickers and clicker grades
  - missing grades on LEARN
  - illness
  - midterm remark requests

- dvogel@uwaterloo.ca and kevinh@uwaterloo.ca (Instructors)
  - anything not addressed by the above

Staff

All office hours will be posted on LEARN.

Daniel Vogel (Instructor)

- DC 3145, dvogel@uwaterloo.ca

Kevin Harrigan (Instructor)

- DC 3602, kevinh@uwaterloo.ca

Barbara Daly (Instructional Support Coordinator)

- MC 4007, x36692, bmzister@uwaterloo.ca

Instructional Support Assistants

- Izzy Elkork
- Murphy Yip
- Yuhan Zhang
  All reachable at cs105@uwaterloo.ca

Lab Instructor Teaching Assistants

- Margaret Foley
- Kin Pong Fung
- Jeremy Hartman
- Jay Henderson
- Antony Irudayaraj
- Nikhita Joshi
- Xiaowei Kuang
- Matthew Lakier
- Johann Wentzel
Course Schedule

Three hours of lecture per week, plus two 1.5 hour mandatory labs per week.

Lectures
- 001 MW 8:30-9:50 AM MC 4020 Kevin Harrigan
- 002 MW 10:00-11:20 AM MC 4020 Kevin Harrigan
- 003 MW 11:30-12:50 PM STC 0050 Daniel Vogel
- 004 MW 1:00-2:20 PM STC 0050 Daniel Vogel

Lab Sections

<table>
<thead>
<tr>
<th>Lab</th>
<th>Time</th>
<th>Location</th>
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<tbody>
<tr>
<td>101</td>
<td>10:00-11:20 MW</td>
<td>MC 3003</td>
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<tr>
<td>102</td>
<td>10:00-11:20 MW</td>
<td>MC 3005</td>
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<td>103</td>
<td>10:00-11:20 MW</td>
<td>MC 3027</td>
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<td>104</td>
<td>11:30-12:50 MW</td>
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<td>106</td>
<td>11:30-12:50 MW</td>
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<td>107</td>
<td>01:00-02:20 MW</td>
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<td>108</td>
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<td>01:00-02:20 MW</td>
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<td>110</td>
<td>02:30-03:50 MW</td>
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<td>111</td>
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<td>112</td>
<td>02:30-03:50 MW</td>
<td>MC 3027</td>
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# Topics

The following schedule is tentative and may change throughout the term, see the course LEARN site for updates.

<table>
<thead>
<tr>
<th>Day</th>
<th>Lectures</th>
<th>Concepts</th>
<th>Labs and Assignments</th>
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<tbody>
<tr>
<td>Wed, Sep 4</td>
<td>Introduction</td>
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<td>Lab 0</td>
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<tr>
<td>Mon, Sep 9</td>
<td>Algorithms &amp; Code</td>
<td>Syntax Errors</td>
<td>Lab 1</td>
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<tr>
<td>Wed, Sep 11</td>
<td>Drawing</td>
<td>2D Coordinate Statements Commenting</td>
<td>Lab 2</td>
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<td>Control Flow</td>
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<td>[Labs 0, 1, 2 due Wed Assignment 1 due Fri]</td>
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<td>Mon, Sep 16</td>
<td>Attributes</td>
<td>Program State</td>
<td>Lab 3</td>
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<td>Colour Formats</td>
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<td>Wed, Sep 18</td>
<td>Interaction</td>
<td>Events</td>
<td>Lab 4</td>
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<td>[Labs 3, 4 due Wed Assignment 2 due Fri]</td>
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<td>Mon, Sep 23</td>
<td>Variables 1</td>
<td>Declaration vs.</td>
<td>Lab 5</td>
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<td>Initialization</td>
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<td>Memory</td>
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<td>Wed, Sep 25</td>
<td>Variables 2</td>
<td>Types, Binary Numbers,</td>
<td>Lab 6</td>
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<td>Precision</td>
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<td>[Labs 5, 6 due Wed Assignment 3 due Fri]</td>
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<td>Mon, Sep 30</td>
<td>Conditionals 1</td>
<td>Boolean Logic</td>
<td>Lab 7</td>
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<td>Relational Expressions</td>
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<td>Wed, Oct 2</td>
<td>Conditionals 2</td>
<td>Logical Operators</td>
<td>Lab 8</td>
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<td>Binary</td>
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<td>[Labs 7, 8 due Wed Assignment 4 due Fri]</td>
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<td>Mon, Oct 7</td>
<td>Loops 1</td>
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<td>Lab 9</td>
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<td>Wed, Oct 9</td>
<td>Loops 2</td>
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<td>[Labs 9, 10 due Wed Assignment 5 due Fri]</td>
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<td>Mon, Oct 14</td>
<td>Study Break</td>
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<td>Wed, Oct 16</td>
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<td>Mon, Oct 21</td>
<td>Loops 3</td>
<td>Scope</td>
<td>Lab 11</td>
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<td>Remapping</td>
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<td>Wed, Oct 23</td>
<td>Functions 1</td>
<td>Parameters</td>
<td>Lab 12</td>
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<td><strong>Fri, Oct 25</strong></td>
<td><strong>Midterm at 6:30 PM</strong></td>
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<td>Mon, Oct 28</td>
<td>Functions 2</td>
<td>Returning Values</td>
<td>Lab 13</td>
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<td>Wed, Oct 30</td>
<td>Functions 3</td>
<td>Circle Hit Testing</td>
<td>Lab 14</td>
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<td>[Labs 13, 14 due Wed Assignment 6 due Fri]</td>
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<td>Mon, Nov 4</td>
<td>Midterm take-up</td>
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<td>(lab for midterm questions)</td>
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<td>Date</td>
<td>Topic</td>
<td>Assignment</td>
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<td>Wed, Nov 6</td>
<td>Program Design</td>
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<td>Modularity Testing</td>
<td>Lab 15</td>
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<td><strong>Lab 15 due Wed</strong></td>
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<td><strong>Assignment 7 due Fri</strong></td>
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<td>Mon, Nov 11</td>
<td>Arrays 1</td>
<td>Object Creation</td>
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<td>Wed, Nov 13</td>
<td>Arrays 2</td>
<td>Array Operation Idiom</td>
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<td>Lab 16</td>
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<td>Labs 16, 17 due Wed</td>
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<td><strong>Assignment 8 due Fri</strong></td>
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<td>Mon, Nov 18</td>
<td>Arrays 3</td>
<td>Complexity</td>
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<td>Lab 18</td>
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<td>Images 1</td>
<td>Pixels</td>
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<td>Lab 19</td>
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<td>Images 2</td>
<td>Lab 20</td>
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<td>Debugging</td>
<td>Debugging</td>
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<td>(lab for project help)</td>
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<td>Lab 20 due Wed</td>
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<tr>
<td>Mon, Dec 2</td>
<td>Video and Sound</td>
<td>(lab for project help)</td>
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<td><strong>Final Project</strong></td>
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<td><strong>due Tue, Dec 3 11:59 PM</strong></td>
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**Grading**

- Participation: 5%
- Labs: 5%
- Assignments: 24%
- Project: 6%
- Midterm: 20%
- Final Exam: 40%

**Participation**

Clickers will be used during all lectures starting in the second week for feedback and small multiple choice quizzes.

- Participation is calculated by taking the best 75% of clicker grades.
- Students must bring a registered and functioning clicker device to every class.
- Only iClicker devices are supported.
- It is not possible to submit clicker answers in any other form, such as email or paper.

**Labs**

There are lab programming exercises to be completed during scheduled lab times held each week on Monday and Wednesday.

- Lab handouts are posted on LEARN before the first lab time that week.
- Each set of labs are due on Wednesday at 11:59 PM (unless otherwise indicated), see the schedule for details.
- Labs are created by the instructor and marked by the instructional support assistants and graduate teaching assistants based on specifications drawn up by the instructor.
- The grade will typically be available on LEARN less than 1 week after the due date.
- All labs are weighted equally.
Assignments

There are 8 programming assignments.

- All materials for the current week’s assignment are posted on LEARN before the first lab time that week.
- Assignments are due on Friday at 11:59 PM (unless otherwise indicated), see the schedule for details.
- Assignments are created by the instructor and marked by the instructor, instructional support assistants, and graduate teaching assistants based on specifications drawn up by the instructor.
- The grade with feedback will typically be available on LEARN less than 1 week after the assignment is due.
- The assignment with the lowest mark will be excluded, and the remaining 7 assignments will be weighted equally.

Final Project

The final project is an open-ended assignment where you design and implement a program of your choice. This is a culmination of all concepts learned throughout the term and a chance to conceive and design a complete program.

Exams

There is a midterm and final exam scheduled outside of lecture and lab times.

- You must pass the weighted average of the midterm and final exam to pass the course. Specifically, if the weighted average of your midterm and final exam is less than 50, you will fail the course regardless of your other marks in the course. In this case, your final course grade will be either the weighted average of the exams, or the overall course grade, which ever is lower. See the explanation of this in the first week’s lecture.
- The midterm and final are created by the instructor and marked by the instructor, instructional support assistants, and graduate teaching assistants based on specifications drawn up by the instructor.

Policies

Remarking and Grade Appeals

Midterm Exam

If you believe errors were made in the marking of a midterm exam, email the course instructional support coordinator (bmzister@uwaterloo.ca). You need to submit a Remark Request on LEARN with a written explanation within a short period (to be announced) after the exam is made available. In all cases, you should check the posted model solutions to understand your errors.

Assignments and Labs

If you believe errors were made in the marking of an assignment or lab, email the course account (cs105@uwaterloo.ca) and state clearly what you feel was marked incorrectly. Standard policy is that any remark request means the entire assignment will be remarked.
• The deadline for a remark request is one week after feedback and comments are released for that lab or assignment.

Lab and Assignment Submission

All assignments and labs must be submitted to LEARN.

• It is the student's responsibility to verify assignments and labs are submitted to the correct LEARN dropbox, in the correct format, and that the correct files were submitted.

Lab and Assignment Deadlines

Assignments and labs that are submitted late will receive a mark of 0.

• There are no deadline extensions for Labs.
• There are no deadline extensions for Assignments.
• There is no deadline extension for the Final Project.

After an assignment or lab due date has passed, you may still submit your work for feedback only (no marks). You must inform the CS105 instructional support assistants by email so they are aware of your submission and request for feedback.

Missed Work Due to Illness

With appropriate, authorized documentation, assignment work may be excused. If a missed assignment is excused, its weight is distributed over the remaining un-excused assignments. In the interest of understanding the course material for future assignments and exams, students who miss work are encouraged to do complete it when they are able, submit it to cs105@uwaterloo.ca, and request feedback.

Group Work

All labs and assignments are individual work.

Other Important Information

Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. Check the Office of Academic Integrity website, www.uwaterloo.ca/academicintegrity, for more information.

All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. This site explains why academic integrity is important and how students can avoid academic misconduct. It also identifies resources available on campus for students and faculty to help achieve academic integrity in and out of the classroom.

MOSS (Measure of Software Similarities) or a similar tool may be used in this course as a means of comparing students' assignments to ensure academic integrity.
Grievance

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, [http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm). When in doubt please be certain to contact the departments administrative assistant who will provide further assistance.

Discipline

A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about rules for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean.

For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, [http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm). For typical penalties check Guidelines for the Assessment of Penalties, [http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm](http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm).

Avoiding Academic Offenses

Most students are unaware of the line between acceptable and unacceptable academic behaviour, especially when discussing assignments with classmates and using the work of other students. For information on commonly misunderstood academic offenses and how to avoid them, students should refer to the Faculty of Mathematics Cheating and Student Academic Discipline Policy, [https://uwaterloo.ca/math/current-undergraduates/regulations-and-procedures/cheating-and-student-academic-discipline-guidelines](https://uwaterloo.ca/math/current-undergraduates/regulations-and-procedures/cheating-and-student-academic-discipline-guidelines)

 Appeals

A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, [http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm).

Note for students with disabilities

The Office for Persons with Disabilities (OPD), located in Needles Hall, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

See url: [https://uwaterloo.ca/accessability-services/](https://uwaterloo.ca/accessability-services/) for more information.

Intellectual Property

Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:
• Lecture content, spoken and written (and any audio/video recording thereof);
• Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
• Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
• Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student’s educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

Mental Health

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support.

On-campus Resources

• Campus Wellness https://uwaterloo.ca/campus-wellness/
• Counselling Services: counselling.services@uwaterloo.ca / 519-888-4567 ext 32655 / Needles Hall North 2nd floor, (NH 2401)
• MATES: one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services: mates@uwaterloo.ca
• Health Services service: located across the creek from Student Life Centre, 519-888-4096.

Off-campus Resources

• Good2Talk (24/7): Free confidential help line for post-secondary students. Phone: 1-866-925-5454
• Here 24/7: Mental Health and Crisis Service Team. Phone: 1-844-437-3247
• OK2BME: set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Diversity

It is our intent that students from all diverse backgrounds and perspectives be well served by this course, and that students' learning needs be addressed both in and out of class. We recognize the immense value of the diversity in identities, perspectives, and contributions that students bring, and the benefit it has on our educational environment. Your suggestions are
encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or for other students or student groups. In particular:

- We will gladly honour your request to address you by an alternate/preferred name or gender pronoun. Please advise us of this preference early in the semester so we may make appropriate changes to our records.
- We will honour your religious holidays and celebrations. Please inform us of these at the start of the course.
- We will follow AccessAbility Services guidelines and protocols on how to best support students with different learning needs.