

# ENVS\*6190 - Environmental Microbial Technology

Winter 2026 Course Outline

Section: 01

Credits: 0.50

## Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

## Calendar Description

Current topics in selected areas of environmental microbial technology. An emphasis will be placed on the physiology and genetics of microorganisms useful in environmental biotechnology. The course involves extensive use of current journal articles. An undergraduate degree in microbiology or related discipline is recommended prior to registering in this course.

**Department(s):** School of Environmental Sciences

## Course Description

The graduate course in Environmental Microbial Technology will provide an interactive forum for students to participate in an advanced discussion on current techniques and research in environmental microbiology. Using a combination of oral presentations by students, written assignments, and laboratory demonstrations, students will be given the opportunity to discuss and debate current issues in environmental microbiology.

## Lecture Schedule

Wednesdays 11:30 pm - 2:30 pm ALEX 337

Labs TBA

## Instructor Information

**Kari Dunfield**

Email: [dunfield@uoguelph.ca](mailto:dunfield@uoguelph.ca)

## Seminar Reading List

We will assemble a list of pivotal articles from the scientific literature that will serve as sources of factual information. The articles will be available in PDF format on courselink

## Textbooks

| Group       | Title   | Author            | ISBN  |
|-------------|---|-------------------|---|
| Recommended | Understanding and utilising soil microbiomes for a more sustainable agriculture | Ed. Kari Dunfield | <a href="https://www.taylorfrancis.com/books/edit/10.1201/9781003684640/understanding-utilising-soil-microbiomes-sustainable-agriculture-kari-dunfield">https://www.taylorfrancis.com/books/edit/10.1201/9781003684640/understanding-utilising-soil-microbiomes-sustainable-agriculture-kari-dunfield</a> |

|             |   |                    |   |
|-------------|---|--------------------|---|
| Recommended | Soil microbiology, ecology and biochemistry. 4th ed | Paul               | <a href="https://www.sciencedirect.com/subzero.lib.uoguelph.ca/book/9780124159556/soil-microbiology-ecology-and-biochemistry">https://www.sciencedirect-com.subzero.lib.uoguelph.ca/book/9780124159556/soil-microbiology-ecology-and-biochemistry</a> |
| Recommended | Encyclopedia of Soils in the Environment            | Mafa-Attoye et al. | <a href="https://doi.org/10.1016/B978-0-12-822974-3.00239-1">https://doi.org/10.1016/B978-0-12-822974-3.00239-1</a>   |
| Recommended | Encyclopedia of Soils in the environmenti           | Mitter et al.      | <a href="https://doi.org/10.1016/B978-0-12-822974-3.00241-X">dx.doi.org/10.1016/B978-0-12-822974-3.00241-X</a>  |
| Recommended | Encyclopedia of Soils in the Environment            | Tosi et al.        | <a href="https://doi.org/10.1016/B978-0-12-822974-3.00242-1">dx.doi.org/10.1016/B978-0-12-822974-3.00242-1</a>  |

## Learning Resources

## Required Resources

### CourseLink

The instructors use CourseLink (<https://courselink.uoguelph.ca>) for posting class announcements, lecture slides, grades and other required and recommended materials that is relevant to this course. Please check CourseLink at least once a day.

If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support.

Email: [courselink@uoguelph.ca](mailto:courselink@uoguelph.ca)

Tel: 519-824-4120 ext. 56939 Toll-Free (CAN/USA): 1-866-275-1478

### Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (<https://www.uoguelph.ca/uaic/programcounsellors/>) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (<https://www.lib.uoguelph.ca/using-library/spaces/learning-commons/>) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.

## Cost of Textbooks and Learning Resources

| Textbook / Learning Resource  | Required / Recommended | Cost        |
|---|------------------------|-------------|
| Understanding and utilising soil microbiomes for a more sustainable agriculture | Recommended            | Free Online |
| Soil microbiology, ecology and biochemistry                                     | Recommended            | Free Online |
| Encyclopedia of Soils in the Environment  | Recommended            | Free Online |

Students are advised that prices are often determined by the publisher or bookstore and may be subject to change.

## Course Learning Outcomes

1. Provide students with an advanced understanding of targeted issues in environmental microbiology and key concepts therein
2. To expose students to a broad range of techniques in environmental microbiology
3. To provide students with an opportunity to develop critical thinking and communication skills in order to better communicate the essential elements of environmental microbiology in public and political arenas

## Course Structure

The primary goal of this course is to promote students to think critically and independently about methods in environmental microbiology and to provide them with an opportunity to effectively apply this understanding to a research topic. To achieve this, students will be asked to write a research proposal, make one final presentation and lead paper critiques on an environmental microbiology issue of their choice. Participants will gain experience delving into the primary scientific literature to extract evidence that will be used to bolster their research proposals. They will be invited to participate in lab demonstrations of a selection of the microbiology techniques we will be discussing. The course will therefore not adopt a standard

lecture format but rather emphasize self-reliant (independent) learning through emphasis on participation, discussion and debate of presented or assigned material.

**Format:** Except for the first meetings which we will use to get an idea of the issues, class meetings will combine seminar-style discussion with occasional lab demos.

For first half of the course, each student will present a paper in the area of their final research proposal, for class discussion and critique.

The last portion of the course will be used to discuss methodology, and prepare for the final research proposal due at the end of the course.

## Schedule of Topics and Assignments

| Week of | Topic                                       | Activities                 | Due   |
|---------|---|----------------------------|---|
| 1/5     | Meet and greet                              |                            |   |
| 1/12    | Course outline. Paper discussion - Kari led | Lab Introduction           |   |
| 1/19    | Paper Discussion Week 1                     | Lab #1: DNA Extraction     | Friday 1/16: Send papers to Kari for class to read          |
| 1/26    | Paper Discussion Week 2                     |                            | Friday 1/23: Send papers to Kari for class to read          |
| 2/2     | Paper Discussion Week 3                     | Lab #2: DNA Quantification | Friday 1/30: Send papers to Kari for class to read          |
| 2/9     | Paper Discussion Week 4                     | Lab #3: PCR/QPCR           | Friday 2/6: Send papers for Kari for class to read          |
| 2/16    |   | Winter Break               |   |
| 2/23    |   | Lab #4: Sequencing         |   |
| 3/2     | Presentations: Hypothesis and Objectives    |                            |   |
| 3/9     | Presentations: Experimental Design          |                            |   |
| 3/16    | Presentations: Methods                      |                            |   |
| 3/23    |   | Lab #5: Metagenomics       |   |
| 3/30    | Presentations: Impact and Budget            |                            |   |
| 4/6     |   |                            | Draft Proposal Due to Reviewer: April 10                    |
| 4/13    |   |                            | Peer Reviews Back: April 13<br>Final Proposal Due: April 17 |
| 4/20    | Panel meeting: April 20                     |                            | Lab summaries Due: April 20                                 |

## Lab / Seminar Schedule

Students will be asked to attend lab demonstrations. They will be scheduled during class times or occasionally during a mutually agreed upon time that is TBD.

## Assessment Breakdown

| Description  | Weighting (%) | Due Date   |
|--|---------------|------------|
| Lab Demonstrations                                   | 15%           | Week 14    |
| Discussion Leader -Paper Critique                    | 15%           | Week 2 -6  |
| Research proposals (In Class Presentations)          | 25%           | Week 7-11  |
| NSERC Proposal                                       | 35%           | Week 12    |
| Peer Evaluation: Research proposal and Panel meeting | 10%           | Throughout |

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## Assessment Details

### Reflective Activities

#### Lab Demonstrations

15

Students will be asked to attend lab demonstrations. The students will be asked to provide summaries (maximum 1 page each) of three of the demonstrations, demonstrating their knowledge of the underlying science.

Course Learning Outcomes Assessed: 2

### Discussion

#### Paper Critique Discussion Leader

15

Each student will be asked to lead a discussion and critique of a paper that is cited in their research proposal.

Course Learning Outcomes Assessed: 1

### Presentation

#### Research Proposals (In class Presentations)

25

Each student will develop a 4 x 7-minute Power Point presentations pertaining to the subject of their final research proposal. Students will present their hypothesis & objectives; experimental design; methods; budget & impact to society

Course Learning Outcomes Assessed: 3

### Research Proposal

#### Research Proposal

35

Students will submit an NSERC proposal on a topic of their choosing associated with environmental microbiology. The proposal will be reviewed by a panel of their peers.

Course Learning Outcomes Assessed: 1, 2, 3

### Peer Evaluation

#### Peer evaluation, NSERC Panel

10

Peer review of in class presentations and proposal

Course Learning Outcomes Assessed: 1, 2, 3

## Last Day to Drop Course

The final day to drop Winter 2026 courses without academic penalty is the last day of classes: April 06

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

## Course Grading Policies

### Submission of Assignments

Assignments are to be submitted through email to the course instructor.

### Late Assignment

Assignments handed-in late, for which an extension has not been granted ahead of time, will lose 10 marks (out of 100) per day late (or part thereof). For example, if you receive an 85% on your assignment but you submitted one day late, you will receive a 75% instead. Assignments submitted one week (or later) after the due date will not be accepted. If you require an extension on an assignment, you must have a valid reason and contact Dr. Dunfield in advance of the due date.

Extensions will be considered for medical reasons or other extenuating circumstances.

## Course Standard Statements

### Plagiarism Software - Turnitin

In this course, your instructors will be using Turnitin, integrated with the CourseLink Dropbox tool, to detect possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to maintain academic integrity at the University of Guelph. All submitted assignments will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. All assignments will be screened, but you will only have access to your Turnitin score if you contact the instructor at least two days before the due date.

### Use of Generative AI

Students may use generative AI for [editing, translating, outlining, brainstorming, revising, etc.] their work throughout the course so long as the use of generative AI is referenced and cited following citation instructions given below. Use of generative AI outside the stated use or without citation will constitute academic misconduct. It is the student's responsibility to be clear on the limitations for use and to be clear on the expectations for citation and reference and to do so appropriately.

- "[Generative AI tool]. (YYYY/MM/DD of prompt). "Text of prompt". Generated using [Name of Tool.] Website of tool"
- e.g., "ChatGPT4. (2023/05/31). "Suggest a cookie recipe that combines oatmeal, chocolates chips, eggs and sugar." Generated using OpenAI's ChatGPT. <https://chat.openai.com> (<https://chat.openai.com/>)"

## Standard Statements for Graduate Courses

### Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-misconduct/>) is outlined in the Graduate Calendar.

### Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Use of the SAS Exam Centre requires students to make a booking at least 10 business days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

### Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-accommodation-religious-obligations/>)

### Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

## Drop Date

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for Dropping Courses (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>) dropping courses are available in the Graduate Calendar (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>).

## Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly. e-mail is the official route of communication between the University and its students.

## Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources. (<https://wellness.uoguelph.ca/shine-this-year/>) The Student Wellness team are here to help and welcome the opportunity to connect with you.

## Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

## Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

## When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Graduate Calendar for information on regulations and procedures for Academic Consideration (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/grounds-academic-consideration/>).