ENVS*2090 Problem Solving in Environmental Biology

Winter 2022
Section(s): 01

School of Environmental Sciences
Credit Weight: 0.50
Version 1.00 - January 10, 2022

1 Course Details

1.1 Calendar Description
This course provides an introduction to current issues and problems in environmental biology. Approaches to characterizing and addressing problems through the systematic application of the scientific method will be critically examined. Students will have the opportunity to practice both oral and written presentation skills.

Pre-Requisites: BIOL*1070, BIOL*1090, CHEM*1050, MATH*1080

1.2 Timetable
Monday, Wednesday, Friday - 2:30 pm - 3:20 pm

1.3 Final Exam
No final exam.

2 Instructional Support

2.1 Instructional Support Team
Instructor: Marc Habash
Email: mhabash@uoguelph.ca
Telephone: +1-519-824-4120 x52748
Office: ECBL 3238
Office Hours: By appointment
3 Learning Resources

3.1 Required Resources

Experimental Design for the Life Sciences (Textbook)
ISBN: 978-0198717355

How to Do Ecology: A concise Handbook (Textbook)
978-0691161761

Note: this textbook is available as an online eBook via the UofG library

Statistics: A very short introduction (Textbook)

Note: this textbook is available as an online eBook via the UofG library.

4 Learning Outcomes

4.1 Course Learning Outcomes
By the end of this course, you should be able to:
1. Apply the scientific method to characterize and evaluate problems in environmental biology
2. Formulate research questions addressing a problem of biological origin
3. Analyze the reliability, replicability and relevance of scientific evidence
4. Undertake a research project to evaluate human impact on the environment
5. Present written and oral works addressing problems in environmental biology

5 Teaching and Learning Activities
Lecture Content:
1. Research and Problem-solving
2. Problem characterization
3. Developing Research questions
4. Deduction and hypothesis testing
5. Experimental design
6. Use of statistics in science

Seminars/Labs:

Attendance is mandatory. Labs/Seminars will be utilized to apply information presented in lecture to discuss current issues in environmental biology.

### 5.1 Lecture

<table>
<thead>
<tr>
<th>When</th>
<th>Topic</th>
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<tbody>
<tr>
<td><strong>Week 1</strong></td>
<td><strong>Introduction and Rationale: Research and Problem-solving</strong></td>
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<td><strong>Introduction to Problem Solving: Conceptual Framework</strong></td>
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<td><strong>Week 2</strong></td>
<td><strong>Nature of Problems</strong></td>
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<td><strong>Problem Characterization</strong></td>
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<td><strong>Solutions: Consequences and Risks</strong></td>
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<td><strong>Week 3</strong></td>
<td><strong>Solutions: Consequences and Risks</strong></td>
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<td><strong>Developing Research Questions</strong></td>
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<td><strong>First Steps in Research: Induction and Retroduction</strong></td>
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<td>Week</td>
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<td>Week 4</td>
<td>Deduction and Hypothesis Testing</td>
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<td>Experimental Design: Testing Hypotheses</td>
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<td>Week 5</td>
<td>Project 1 presentations</td>
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<td>Week 6</td>
<td>General Review of Project 1 presentations</td>
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<td>Controls and Randomization: Experimental Design</td>
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<td>Measurement and Error: Why Statistics?</td>
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<td>Week 7</td>
<td>The Use of Statistics: Descriptions</td>
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<td>The Use of Statistics: Estimates</td>
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<td>Week 8</td>
<td>Project 3 presentations</td>
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<td>Project 3 presentation discussions</td>
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<td>Week 9</td>
<td>The Use of Statistics: Hypothesis Testing</td>
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<td>The Use of Statistics: Correlations</td>
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<td>Week 10</td>
<td>Use of Stats in Science</td>
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<td>Work on Project 3</td>
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### 5.2 Seminar

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<th>Topic</th>
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<tr>
<td>Week 1</td>
<td>Outlining Projects 2 and 3</td>
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<tr>
<td>Week 2</td>
<td>Invasive Species: Concepts – Project 1</td>
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<td>Week 5</td>
<td>Project 1 presentations</td>
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<tr>
<td>Week 7</td>
<td>Experimental Design: Meetings to discuss Project 3</td>
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<tr>
<td>Week 8</td>
<td>Project 3 Proposal Presentations and Discussion</td>
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### 5.3 Lab

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<th>When</th>
<th>Topic</th>
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<tr>
<td>Week 9</td>
<td>Project 3 workshop I</td>
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<tr>
<td>Week 10</td>
<td>Project 3 Workshop II</td>
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<td>Week 11</td>
<td>Project 3 Workshop III</td>
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### 6 Assessments
6.1 Assessment Details

**Project 1: Characterizing an Environmental Problem of Biological Origin: Invasive Species (25%)**
- **Date:** Presentation - Week 5, Position paper - Week 6
- Presentation (10%) - Feb. 7, 9, 11, 2022
- Presentation reflection (5%) - to be completed on days when not presenting (Feb. 7, 9, 11)
- Position paper (10%) - Feb. 18, 2022
- See CourseLink for project details

**Project 2: Solving a Research Problem: Measuring the Impact of Human Activity in Biological Systems (25%)**
- **Date:** Week 10
- Due March 27, 2022
- See CourseLink for project details

**Project 3: Solving a Research Problem: Conducting an Experiment to Evaluate Human Impact on the Environment (35%)**
- **Date:** Weeks 8 and 12
- Project Proposal Presentation (5%) - March 7, 9, 11, 2022
- Final Group Presentation/Poster (15%) - April 4, 6, 8, 2022
- Final Lab Report, individual (15%) - April 14, 2022
- See CourseLink for project details

**Lecture test (15%)**
- **Date:** Week 11

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7 University Statements

7.1 Email Communication

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

7.2 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. The grounds for
Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

7.3 Drop Date
Students will have until the last day of classes to drop courses without academic penalty. The
deadline to drop two-semester courses will be the last day of classes in the second semester.
This applies to all students (undergraduate, graduate and diploma) except for Doctor of
Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and
alternative delivery) students. The regulations and procedures for course registration are
available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-
regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

7.4 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.

7.5 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.

Accommodations are available for both permanent and temporary disabilities. It should be
noted that common illnesses such as a cold or the flu do not constitute a disability.
Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website https://www.ridgetownc.com/services/accessibilityservices.cfm

7.6 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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

7.7 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.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph’s procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
7.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

7.10 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).

7.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.