

# ENVS\*4440 - Advanced Controlled Environment Systems

## Winter 2025 Course Outline

**Section: 01**

**Credits: 0.50**

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## Calendar Description

Students will focus on the manipulation of specific environment parameters and how that manipulation affects biological growth and development or achieves a commercial/research objective. The technical skills developed will be balanced with in-depth discussions on the broader environmental and societal implications of controlled environment agriculture (e.g., food insecurity, urban agriculture, adapting to a changing climate). Weekly activities will focus on both practical and theoretical aspects of CES crop production and will be used to support student research activities.

**Prerequisite(s):** ENVS\*3300

**Restriction(s):** Instructor consent required.

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

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## Course Description

ENVS\*4440 - Advanced Controlled Environment Systems builds on the general concepts and plant-environment interactions introduced in ENVS\*3300 (Introduction to Controlled Environment Systems). One-hour lectures will drill down into many of the plant-environment interactions introduced in ENVS\*3300, discuss and demonstrate the tools of the trade (e.g., spectroradiometers), and expose students to career opportunities through guest speakers and student driven interviews. Labs are designed as a semester long experiment where each group (2-3) of students will run a plant production trial to determine the effects of assigned environment manipulations (e.g., light quality, light intensity, temperature, CO<sub>2</sub>, etc.) or production strategies on crop development. Students will receive training on the unique requirements of growth chamber experiment design and data analysis and will be expected to maintain their experiments throughout the semester. Grades will be based on quizzes, lab book maintenance, an industry interview report, and a final presentation/experiment report.

## Lecture Schedule

Mon 10:30am-11:20am in GRHM\*2302 (1/6 to 4/21)

### **Lecture Schedule:**

Monday lectures will be used periodically after week three, but students are expected to reserve the time slot in their schedules as it will also be used for quizzes and presentations. The focus of the course will be the Wednesday lab period and the scheduling of off-hours for plant/experiment maintenance.

### **Lab Schedule**

Wednesdays from 11:30-14:20. Labs will be in the CESRF and the Bovey Greenhouse *after the first week*. Safety certificates must be completed before students will be permitted to engage in lab activities within the CESRF.

## Instructor Information

### **Thomas Graham, PhD**

Associate Professor

Email: tgraham@uoguelph.ca

Office: Bovey 2105

Office Hours:

By appointment

### **Mike Dixon, PhD/University Professor Emeritus**

Professor Emeritus

Email: mdixon@uoguelph.ca

Office: Bovey 1213

Office Hours:

By Appointment

## Learning Resources

### Required Resources

#### Lab Book

Students will be required to maintain a lab book within their group. The lab book will be provided. If lost or damaged, the student/group will receive a new one at a cost of \$25.

#### Personal Protective Equipment

Students will be working in a lab environment and are expected to follow PPE requirements. Students are responsible for their own:

- safety glasses (provided at cost (\$2))
- closed toe shoes

Optional but highly recommended:

- lab coats for general activities (note: if dispensing hazardous chemicals (e.g., acids), a lab coat will be available for that activity)

### 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
Lab book - provided by Instructor	required	\$20/group
Safety glasses	required	\$2/student

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

## Course Learning Outcomes

1. Recognize and use pH, EC, Dissolved oxygen, PAR, leaf area meters, etc.
2. Run a spectral scan (spectroradiometer) on a lighting array.
3. Design and execute a 'typical' plant production experiment within the context of growth chamber requirements & limitations.
4. Statistically analyze CES production data.
5. Become fluent in the basic language used in CEA.
6. Maintain, at a professional level, a valid lab book.

## Assessment Breakdown

Description	Weighting (%)	Due Date
Safety Certificates/training - required for lab access	5%	Wednesday January 8th
Lab book/record keeping evaluation #1	5%	Friday January 24th
Lab book/record keeping evaluation #2	10%	Wednesday February 26th
Lab book/record keeping evaluation #3	15%	Wednesday April 2nd
Group Literature Review - written	10%	Monday January 27th
Literature Review Presentation	5%	January 27 a/o 30th
Informational interview presentation	10%	Wednesday March 26th

Final Report/Presentation	15%	Last week of classes
Organization/engagement/maintenance	5% Instructors; 5% Peers	Last week of classes
Reflective Statement	5%	Monday April 7th
Quiz	10%	Monday March 3rd

## Last Day to Drop Course

The final day to drop Winter 2025 courses without academic penalty is the last day of classes: April 04

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 Standard Statements

### Course Policies

*ENVS\*4440 in a lab intensive course. Students are fully expected to tend to plants and conduct routine measurements on a regular basis outside of dedicated lab/lecture times. Students will be working in groups to achieve the experiential learning objectives of the course. When working in groups, students are expected to show respect to their partners and the class in general, including showing up on time, equally distributing the work/responsibilities, and generally acting in a professional manner.*

### Course Technology Requirements

*Monitoring/measuring equipment will be provided. It is assumed that students will have their own computers/laptops.*

## Standard Statements for Undergraduate 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/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/>) is outlined in the Undergraduate 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.

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 10 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 Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/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**

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 undergraduate students 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 the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/>).

## **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 Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>)