



**Course Syllabus-**  
**Special Topics: Science of Gardening, Spring 2015**

**EEES 4980-001 [CRN: 28969]**

**EEES 6980-001 [CRN: 31385]**

**Department of Environmental Sciences**

Instructor Dr Scott Heckathorn

Office location. 3001F Bowman-Oddy (BO) Hall

Office hours: MW 10:00-12:00; T&TH 12:00-2:00; or by appointment

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Class location. 1230 Wolfe Hall

Class day/time: 9.00-10.00 (lecture), 10:00-11:40 (lab), Friday (F)

Credit hours: 2

Prerequisites: introductory biology or permission of the instructor

**Course Description:**

This course explores the science that underlies gardening, and it is designed to foster greater understanding of basic scientific knowledge and the scientific process, as well as the practical application of science. The course will focus on how plants are affected by their biotic and abiotic environment, especially light, water, temperature, nutrients, soil, as well as enemies and partners.

**Course Format:**

This course is an active-learning inquiry-based class (not a lecture-based course), with both "lecture" and "laboratory" components. The lecture component of each class (*ca.* the first hour of each class) will follow that of a "flipped class" format, wherein the class activities will be centered around problem solving and question-answer discussion, following pre-assigned background reading and homework by students. Following the lecture portion of each class, a hands-on inquiry-based laboratory session will occur. Additional course activities include field trips, a group project on garden design, student presentations, and a student plant-growing competition. The course will emphasize the development of skills in critical thinking, problem solving, quantitation, lab/field techniques, and practical application of scientific knowledge, in addition to fact-based learning and communication.

**Student Learning Outcomes (SLOs):**

This course is designed to address the University of Toledo (UT) Natural Science competency requirements of our general education and core curriculums, by addressing the following goals

**Natural Science Core SLOs:**

- a. Provide an understanding of the nature of science in general and major scientific concepts;
- b. Provide analysis and evaluation of scientific information;
- c. Provide discipline specific principles and information;
- d. Present applications and demonstrate the value of the discipline to society in general;
- e. Introduce scientific reasoning skills.

### UT Core Curriculum Five Fundamental Skills:

- a Communication. UT students must demonstrate abilities to communicate meaningfully, persuasively, and creatively with different audiences through written, oral, numeric, graphic, and visual modes.
- b Personal, Social, and Global Responsibility: UT students must demonstrate understanding of and critical engagement in ethical, cultural, and political discourse and a capacity to work productively as a community member committed to the values of diversity, difference, and the imperatives of justice.
- c Scientific and Quantitative Reasoning and Literacy: UT students must demonstrate the capacity to apply mathematical reasoning and scientific inquiry to diverse problems.
- d Information Literacy: UT students must demonstrate the ability to find, organize, critically assess, and effectively use information to engage in advanced work in a challenging field of study. Students should demonstrate responsible, legal, creative, and ethical use of information.
- e Critical and Integrative Thinking: UT students must be able to integrate reasoning, questioning, and analysis across traditional boundaries of viewpoint, practice, and discipline.

### Required Textbook:

No text book is required for this course, but it will help to have access to a basic college-level textbook on botany/plant biology/plant physiology; recommendations on useful texts will be provided in the first class. During the semester, I will provide copies of or links to essential learning material (text or audio/visual), and I will provide access to a small library of reference texts. Reference texts will be located in the classroom, and will be available for short-term loan, after signing an agreement to return any borrowed material or receive an "incomplete" in the course until the material is returned

### Required Technology:

None.

### Course Website:

Course materials (syllabus, lectures, homework assignments, study guides, extra readings & links, *etc.*) will be posted on the UT "blackboard" course website (Log onto "myUT", then go to "blackboard login", then choose this course). I will also post grades for all exams and assignments on this website, which you can access using your UTAD userID and password.

### Grading and Evaluation:

Grades will be based on:

- two (2) exams (one midterm & one final, each worth 20% of your total semester grade),
- weekly pre-class homework (due at the start of each class) (25%),
- one in-class power-point-based presentation (5%),
- weekly "reports" of each laboratory activity (30%).

Exams will be a combination of short-answer and "lab practical" questions ("lab practical" meaning questions related to physical displays at a series of stations). Exams will be comprehensive. The midterm exam will be conducted during the class period immediately preceding spring break, and the final exam will be given during the week of "final exams". The first exam will be given, graded, and returned to students before the "final withdraw date" for courses. Both exams must be taken (*i.e.*, neither will be dropped from calculating your grade). Make-up exams will only be permitted following justified documented reasons, and make-up exams will be essay exams (see the UT policy at: <http://www.utoledo.edu/policies/academic/undergraduate/>). Only a portion of the exam questions will deal with memorization of "factoids". Many of the questions will require critical thinking and analysis,

synthesis of information, and conceptual understanding. Material for the exams will come from the lectures, labs, and assigned readings. Sample exam questions will be provided for review purposes prior to each exam, as will brief study guides that summarize the main foci of each exam. Both in-class review sessions and out-of-class reviews will precede each exam. If you require special accommodations to complete the exam, please let me know in advance.

Weekly pre-class homework assignments, intended to prepare students for the following class period, will be assigned during most weeks of the course, and this homework will be due at the start of the next class. Typically, each homework assignment will be comprised of reading material and a few questions or problems related to the reading, and will be designed to require *ca.* 2 hours to complete. Because this course is designed as a “flipped class”, wherein class time is spent on active learning rather than listening to a lecture, it is essential that students complete the preparatory homework before coming to class. To incentivize completion of homework prior to class, this assigned homework is associated with a substantial fraction of your overall course grade. Late homework will not be accepted

Each student will give one in-class power-point presentation on optimizing growth of their favorite garden plant. The specific topic of the presentation will be chosen > 3 weeks in advance, in consultation with the instructor, and the student will present results of their research into the topic. Guidelines for research and presentation will be provided by the instructor, and will include general information on effective communication.

Essentially all class periods will involve an active-learning hands-on component (*e.g.*, data collection and analysis, experimental set-up, field trip activities and observations), and each of these activities will have a requirement for the completion of written work that will be turned into me and graded (*e.g.*, experimental designs, problem solving, data collection and analysis, observational records). Such written work may take the form of worksheets, tables/figures, brief lab reports, and, even brief power-point presentations to the class. Such work is classified as “weekly reports of lab activity”.

Overall course grades, based on the earned % of total possible points will follow the standard format

A = > 92%; A<sup>-</sup> = 90-92%  
B<sup>-</sup> = 80-82%, B = 83-86%; B<sup>+</sup> = 87-89%  
C<sup>-</sup> = 70-72%, C = 73-76%; C<sup>+</sup> = 77-79%  
D<sup>-</sup> = 60-62%, D = 63-66%; D<sup>+</sup> = 67-69%  
F = <60%.

Midterm grades and attendance will be posted with the UT Registrar no later than the UT deadline for midterm grades, in order to assist you with decision to drop the course or not.

### **Graduate Credit:**

Graduate students who are participating in the course will complete extra-class readings and associated assignments, in ensure deeper exploration of the course content.

### **Academic Honesty Policy:**

Students are expected to strictly adhere to principles of academic honesty in all aspects of this course, in accordance with UT policies (<http://www.utoledo.edu/dl/students/dishonesty.html>). Academic dishonesty of any kind by students in this course will not be tolerated. At the very least,

students involved in academic dishonesty (including "copy & paste" plagiarism) will receive a grade of "0" on the specific assignment/exam involved. Following a second instance of academic dishonesty, you will receive an automatic "F" for the course, be expelled from the class, and you will be reported to UT administration for further disciplinary action.

### **Classroom Behavior Policy:**

The highest standards of classroom behavior will be expected and enforced in this course. Behavior that is disruptive or disrespectful to fellow students or the instructor will not be tolerated, including unnecessary talking among students, use of electronic devices other than laptop computers used for following the current power-point lecture or taking notes, or reading newspapers or other materials unrelated to class.

In the case of talking during class, I will warn offending students once verbally, and following a second instance, I will dismiss students from that day's class. Repeated offenders will be dismissed from the course and not allowed to return until meeting with University administration. In any instance when classroom behavior warrants an initial verbal in-class warning from me, I will follow up on the incident by providing you a formal written warning via your UT email, so that a written record of the incident and warning is available in the future.

### **Policy on Use of Electronic Devices in this Course:**

Unless otherwise cleared with me first, the use of electronic devices in this course is prohibited, with the exception of the use of laptop computers used for following the current power-point lecture or taking notes. Note that the use of cell phones is prohibited during class, as is the use of laptop computers for purposes not directly related to current lecture material. If you need to send or receive a phone call during class, please step out into the hallway to do so.

### **Attendance Policy:**

In accordance with UT policy (<http://www.utoledo.edu/policies/academic/undergraduate/>), I will provide opportunities to complete missed classes, provided such absences are justified. If you know ahead of time that you will miss a class, then you should communicate this information to me in advance by email or in writing. Unexcused absences, or excused absences which are not "made-up", will reduce your grade in proportion to the total semester class time missed (*i.e.*, during the semester, we have 15 regular classes (excluding the final exam), so each class period is 1/15<sup>th</sup> of your total course time = 6.67% of the semester).

### **Email Policy:**

All correspondence regarding this course between students and instructor should be conducted via your UT email account. I will typically respond to student emails in less than 24 hours.

### **University Policies:**

The University of Toledo is an equal opportunity educational institution.

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course, please contact the Student Disability Services Office.

For a complete listing of current UT undergraduate policies (including those pertaining to academic dishonesty, missed classes), please see: <http://www.utoledo.edu/policies/academic/undergraduate/>.

**Additional Student Learning and Support Services:**

For additional out-of-class learning and support resources at UT (e.g., the UT Learning Enhancement Center, Writing Center, Library, Counseling), see:

<http://www.utoledo.edu/success>

<http://www.utoledo.edu/library/>

<http://www.utoledo.edu/studentaffairs/counseling/>

## SEMESTER SCHEDULE

Week	Lecture Topic	Lab Activity
1 (Jan 16)	Photosynthesis and light	Plant Structure: dissection and microscopy
2 (Jan 23)	Sun vs. shade: light-response curves	Sun vs. shade: physiology
3 (Jan 30)	Sun vs. shade: biomass allocation	Sun vs. shade: morphology
4 (Feb 6)	Water	Water: flood vs. drought
5 (Feb 13)	Nutrients	Nitrogen form and availability and plant growth
6 (Feb 20)	Soil	Effects of different soil media and pot size on plant growth
7 Feb 27)	Temperature	Temperature: heat vs. cold
8 (Mar 6)	<b>Midterm Exam</b>	Starting tomatoes for the class "best tomato" competition; catch-up day for previous labs
9 (Mar 13)	<b>Spring Break</b>	
10 (Mar 20)	Plant partners	Plants and mycorrhizal fungi and/or N-fixing bacteria
11 (Mar 27)	Plant enemies	Herbivore eating trials
12 (Apr 3)	Plant development	Plant Hormones
13 (Apr 10)	Student presentations: "How to grow your favorite plant"	Catch-up day; visit the USDA horticulture lab
14 (Apr 17)	Garden design	Campus garden tour & site measurements
15 (Apr 24)	Field trip: Toledo Botanical Garden	Field trip: Toledo Botanical Garden
16 (May 1)	Group presentations: "Garden design"	Tomato growing competition: final measurements
17 (May 8)	<b>Final Exam (finals week)</b>	