

## **Biology 115: Introductory Plant Biology Laboratory**

The University of Tennessee, Fall, 2017

2 credits: 1 credit lab, 1 credit discussion

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**Catalog Description:** Laboratory work will analyze plant structure, morphology, and function, with an emphasis on methods for observation, identification, and data collection. The discussion will focus on agricultural priority areas of the future: sustainable bioenergy, climate change, food safety, and food security.

Satisfies General Education Requirement: (NS with lab) if taken with Biology 113 or 114.

Contact Hour Distribution: 1 hour discussion and one 2-hour lab.

Recommended Background: 113 or 114 or equivalent.

**Lab/Discussion:** One 3-hour lab or one 3-hour discussion per week; 204 Hesler Biology Building  
Lab 1- Tuesdays 12:20-3:20, Lab 2- Tuesdays 3:35-6:35

### **Lead Instructor/**

#### **Curriculum Coordinator:**

John Reese

318 Hesler Biology Building

[jreese11@vols.utk.edu](mailto:jreese11@vols.utk.edu)

Office Hours: Wednesdays 9:00-10:00am (204 Hesler)

### **Co-lead Instructor/**

#### **Lab Coordinator:**

Chelsea Miller

318 Hesler Biology Building

[cmill107@vols.utk.edu](mailto:cmill107@vols.utk.edu)

Office Hours: Wednesdays 10:00-11:00am (204 Hesler)

### **People to Know:**

Dr. Jessica Budke- Herbarium Director

316 Hesler Building

[jbudke@utk.edu](mailto:jbudke@utk.edu)

Jeff Martin- Greenhouse Manager

130 Hesler Building

[jmarti90@utk.edu](mailto:jmarti90@utk.edu)

### **Course Learning Objectives:**

**By the end of the course, you should demonstrate proficiency in the following:**

- 1) Investigation and description of basic plant, algal, and fungal structure, function, evolution, and ecology
- 2) Use of scientific equipment and methods to examine and identify plants
- 3) Analysis, interpretation, and communication scientific results by various means
- 4) Explanation of how plants, algae, and fungi relate to the USDA priority areas of sustainable bioenergy, climate change, food safety, nutrition, and food security
- 5) Reading and interpretation of scientific literature related to plants, algae, and fungi

## **Support for Learning**

### **Texts and Materials:**

- *Biology 115 Laboratory Activity Instruction Packets*. To be provided by instructors electronically on Canvas. **Students must print and read each week before class! (Required)**
- Raven, P., Evert, R., & Eichhorn, S. (2013) *Biology of Plants*. Eighth Edition W. H. Freeman & Co., New York, NY, 727 pp. **Reading assignments are to be completed each week before class! (Required)**
  - It is fine to purchase the Seventh Edition of the textbook for this course, as there are only minor differences in content, but a large difference in cost. However, the page and figure numbers differ slightly between editions and it is the student's responsibility to make sure they study the correct material.
- *Selected Publications* from primary peer reviewed journals emphasizing the field of Botany. To be available on Canvas. **Students must print and read each week before class! (Required)**
- *Course Syllabus*. To be provided by instructors on Canvas. Students must print. Please place a copy of this syllabus in your lab notebook for reference throughout the semester. Note that the syllabus is subject to change as needed throughout the semester and it is the student's responsibility stay informed of any changes. **(Required)**
- Laboratory Materials: Notebook & drawing pencils. Some students may wish to bring personal materials for dissections: fine-pointed forceps, scissors/razors, or cameras and colored pencils to make their own pictures of organisms. We will discuss the details of this the first day of class. **(Strongly Recommended)**

### **Course website:**

<http://online.utk.edu/> (Canvas).

### **Study Rooms:**

417 Hesler is a quiet study room for majors in Biology. It can also be reserved for group study.

### **Communications:**

- If you cannot make office hours, please use your UTK e-mail (spam filters may exclude other addresses) to schedule a meeting.
- Please allow up to 48 hours for responses to your e-mails. E-mails will likely not be answered after the workday is over or on the weekends, so please be patient outside of normal work hours.

### **Class Policies**

**Policies MUST be followed at all times – no exceptions.**

**Violation will result in a loss of points or dismissal from the lab and/or course.**

### **Lab Safety:**

- There will be no food, drink, or tobacco products used in the lab at any time.
- Personal items should be stowed away and not placed on the lab bench.
- No open-toed shoes can be worn during lab. **You will not be allowed to stay in the laboratory if you have improper shoes!**

### **Lab Rules:**

- You must clean and dispose of all laboratory materials as directed by your instructor before leaving lab. Leave the lab better looking than it did when you arrived.
- There will be no cell phone calls or texts in the lab at any time.

- Punctuality is a must. Interruption of the instructor and class members due to late arrivals is not acceptable. Lab/discussion lasts for 3-hours; you should expect to be there for the full three hours each week.

#### Lab Participation:

- **Class attendance is mandatory** – if you miss a class, you miss the points associated with that class. If you need to miss class due to a University-sponsored activity, you must notify your instructor at least 1 week prior to class, and they will **try** to arrange for you to “make up” the lab that week. Please note that this accommodation is only done for special circumstances. Even then, once the week is over there is no way to make up a lab exercise.
- **Prepare for the upcoming lab prior to attending each week** – this includes reading the lab packets for the upcoming labs, as well as all assigned readings. Print out any required materials before coming to lab! The instructor will expect to see notes on the reading materials at the start of class.
- Assignments must be handed in in the manner requested and at the time requested by your lab instructor. This may include submitting the assignment through the university’s plagiarism detection software Any assignment turned in after the stated due date and time will be subject to a late penalty of 1 grade level per day late.
- Spelling, grammar, and formatting may be considered when grading.
- **Exams and Quizzes will be given at the beginning of lab** – if you are late and miss the quiz, you miss the points. There are no make-up quizzes without written notice from Physician, Fire Chief, Sheriff, Attorney, etc.

\*Note that lab participation, i.e., coming prepared with materials, completed reading assignments with notes/questions for class, etc. may be effect your final grade!

#### Academic Matters:

- Academic dishonesty of any sort will not be tolerated. Students should refer to *Hilltopics* for University policies and procedures regarding these instances. You are expected to abide by The University of Tennessee honor statement in all of your university activities.

***"An essential feature of The University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."***

*(Hilltopics, the UT Student Handbook)*

- Copying sentences, portions of sentences, or re-phrasing sentences in the same order as another student’s will all be flagged as plagiarism by the University’s plagiarism software. You may discuss your labs with other students (this is encouraged), but write your lab work from your own thoughts. Your lab communications and presentations will be submitted through “SafeAssign” and plagiarism will not be tolerated.
- It is expected that all students attending lab will conduct themselves in a manner that is both respectful and accommodating to their laboratory instructors and to their working lab partners/fellow students. Rude and disruptive behavior cannot be tolerated and will result in the dismissal of the student from the lab period and possibly the course.

**Grading Policies****Assessment of Learning (Point Earning Opportunities!)**

Quizzes (4) .....	<b>40</b> points
Written lab communications & Presentations (3) .....	<b>150</b> points
Final Experiment Proposal & Presentation .....	<b>50</b> points
Class Participation .....	<b>60</b> points
Exams (2).....	<b>200</b> points
	Total <b>500</b> points

**-A maximum of 500 points can be earned.** Extra points may be made available on quizzes, exams, and other assignments. This asterisk (\*) indicates potential opportunities for earning extra credit for those who choose to do so (look for it in the syllabus, quizzes, and assignment handouts). Specific details should be discussed with your TA and the instructor.

**Lab Quizzes (10 points each):** The lab quizzes are to keep you up to date and ensure that you are learning and comprehending the material. They will occur during the first 30 minutes of a laboratory period. You must be in lab on time to take the quiz. Each quiz will have questions in a variety of formats. There may be “*Show Me*” questions where you will be asked to find a particular feature for your instructor; there will be a series of prepared slides and/or fresh material for you to choose from and if it is fresh material, you will have to make your own wet mount. When you have located the required feature, raise your hand and your lab instructor will check to see if you have located the correct structure. You get two chances with the show me questions; full credit for getting it right the first time, half credit for getting it right on a second attempt. There may also be “*Prepared Stations*” where laboratory materials will be set up for you to view and then answer a question regarding what you see. Lastly, there may be “*Short Answer*” questions. These questions will range in format from true/false, multiple choice, or short answers with one-word or one-sentence answers. A quick drawing with labels could also be requested.

**Note!:** quizzes will cover material from the lab as well as from the assigned readings!

**Written Lab Communications & Presentations (50 points each):** For three of the lab activities, you will need to prepare a written laboratory report that is similar in form to a primary publication. During these lab activities, you will work in small groups and prepare the final report as a team. The lab reports must follow standard publication structure that includes five principle parts: 1) Introduction, 2) Methods, 3) Results, 4) Discussion and Conclusions, and 5) References. You must include a succinct and alluring title and the names of each of your coauthors. You will not be required to prepare an abstract. Each report should be approximately 2 pages (not including title or references), double spaced, with 12 point Times New Roman font. Specific required details for each section are as follows:

**Title & Authors:** The headline or marquee for your project. It should be concise and enticing!

**Introduction (10 points):** What are you trying to do and why? Identify the issue and provide background premises of the problem. Provide rationale for the experiment itself-what are your aims? Present hypotheses and reasoning behind them.

**Methods (5 points):** What are you doing specifically? Describe how you collected data and how you tested the hypothesis. How did you analyze your data?

**Results (10 points):** What did you find? Describe the data itself here. Explain what data analysis tells you. Provide visualization of the data.

**Discussion and Conclusions (10 points):** What do the results tell you and what is your explanation for them? Was the hypothesis supported or rejected? What are the broader implications of your findings (consider your introductory arguments)? Describe the next steps in this line of research? Lastly, provide overall conclusions about your study.

**References (5 points):** You must provide references for your report (**not websites!**). The formatting of the references is important, as it is unique for each journal. In this lab, we will use the following style:

- **Article:**  
Last name, First initial., First initial. Last name, First initial, Last name. YEAR. Article title. *Journal Name* Issue #: Start page #-Ending page#.  
**Example:** Waterman, R., M. Bidartondo. 2008. Deception above, deception below: linking pollination and mycorrhizal biology of orchids. *Journal of Experimental Botany* 59: 1085-1096.
- **Book:**  
Last name, First initial., First initial. Last name. YEAR. *Book Title*. Publisher Name. City, State (or country when applicable). Ending page # pp.  
**Example:** Darwin, C. 1888. *The Various Contrivances by Which Orchids are Fertilised by Insects*. J. Murray Publishers. London, England. 300 pp.

**It is highly recommended that you download and use citation software such as EndNote or Zotero.** These are available from the university website here: <http://libguides.utk.edu/citeman/>. There are tutorials for installation and use available there as well. Citation management software will be useful for nearly if not all of your courses, so it's a good idea to start using one if you haven't already.

**In- Class Presentation (10 points):** On Peer Review days, you will bring a draft of your lab communication

**Exams (100 points each):** Each lab exam is an expanded version of the quizzes and the same formats and contents will apply. The lab exams cover more material (the first half of the course and the second half of the course respectively) so there will be more questions on them.

**Final Experiment Proposal & Presentation (50 points):** The final project for this course will consist of designing an experiment in plant biology that interests you. A written proposal will be submitted that contains the background theory/rationale for the project, as well as methods/materials you would use to carry out that project. You will also present your proposal to the class along with expected results and implications of those results. More details about this project will be announced as the semester progresses.

### **Final Grades**

Final letter grades will be determined by the total percentage of 500 points accumulated as follows:

A	93 – 100%	C	73 – 76%
A-	90 – 92%	C-	70 – 72%
B+	87 – 89%	D+	67 – 69%
B	83 – 86%	D	63 – 66%
B-	80 – 82%	D-	60 – 62%
C+	77 – 79%	F	<60%

## **Other Information**

### **Dean of Students:**

- <http://dos.utk.edu/>

**Disability Services:** If you need course adaptations or accommodations because of a documented disability, please contact me privately to discuss your needs. If you have questions or concerns about disabilities or emergency information to share, please contact Disability Services: 100 Dunford Hall; 974-6807 or 865-622-6566 for video phone; Email: [ods@utk.edu](mailto:ods@utk.edu); Website: <http://ods.utk.edu/>).

### **Academic Assistance:**

Tutoring: The Division of Biology does not offer tutoring services. Contact the Student Success Center and the Academic Support Unit of The Office of Minority Student Affairs for information about tutoring opportunities.

- Student Success Center: The comprehensive source for information, services, and resources to assist your success at UT: <http://studentsuccess.utk.edu>
  - 812 Volunteer Boulevard, Greve Hall, room 324
  - 865 974-6641, Email: [studentsuccess@utk.edu](mailto:studentsuccess@utk.edu)

### **Technical Assistance:**

Blackboard, clickers, or general information technology assistance:

- Help Desk: 865 974 9900 (M – F, 8:00 – 5:00)
- OIT Walk-In Help Desk: Commons, 2<sup>nd</sup> floor Hodges Library, 9am-9pm M-Th, 9am-5pm F, 4p-9p Su
- Turning Technologies (clickers): 866 746 3015

### **Counseling Center:**

- <http://counselingcenter.utk.edu/>
- 1800 Volunteer Boulevard
- 865 974-2196, Email: [counselingcenter@utk.edu](mailto:counselingcenter@utk.edu)

### **Other Resources for Students:**

- One Stop: <http://onestop.utk.edu> (Hodges Library, Ground Floor, 8a-5p M-F)
- Undergraduate Catalogs: <http://catalog.utk.edu> (Listing of academic programs, courses, and policies)
- Hilltopics: <http://hilltopics.utk.edu> (Campus and academic policies, procedures and standards of conduct)
- Course Timetable: [https://bannersb.utk.edu/kbanpr/bwckschd.p\\_disp\\_dyn\\_sched](https://bannersb.utk.edu/kbanpr/bwckschd.p_disp_dyn_sched) (Schedule of classes)
- Academic Planning: <http://www.utk.edu/advising> (Advising resources, course requirements, major guides)
- Library: <http://www.lib.utk.edu> (Access to library resources, databases, course reserves, and services)
- Center for Career Development: <http://career.utk.edu> (Career counseling and resources; HIRE-A-VOL job search system)

## **DEGREE LEVEL LEARNING OUTCOMES**

**Students seeking a degree in Biological Sciences (whether the concentration is in Biochemistry, Cellular, and Molecular Biology, Ecology and Evolutionary Biology, or Microbiology) are expected to be able to do the following by the time they graduate:**

Explain and provide examples of each the five big ideas in Biology, using their knowledge of biological concepts gained from their course of study:

- **Evolution:** Populations of organisms and their cellular components have changed over time through both selective and non-selective evolutionary processes.
- **Structure and Function:** All living systems (organisms, ecosystems, etc.) are made of structural components whose arrangement determines the function of the systems.
- **Information Flow and Storage:** Information (DNA, for example) and signals are used and exchanged within and among organisms to direct their functioning.
- **Transformations of Energy and Matter:** All living things acquire, use, and release and cycle matter and energy for cellular/organismal functioning.
- **Systems:** Living systems are interconnected, and they interact and influence each other on multiple levels.

*These biological concepts are more fully explained in the AAAS / NSF report "Vision and Change in Undergraduate Biology Education" ([visionandchange.org](http://visionandchange.org))*

Demonstrate the ability to perform the following scientific practices:

0. Formulate empirically-testable hypotheses
1. Interpret visual representations (figures and diagrams)
2. Evaluate data and come to a conclusion (with evidence) (formulate an argument)

**-Student ability to achieve these learning objectives will be tested periodically as part of their departmental requirements.**

**Course Schedule**

<b>Week</b>	<b>Date</b>	<b>Lab/Discussion</b>	<b>Assignments</b>	<b>Reading</b>	<b>Assignments Due (for that week)</b>
0	22 Aug	No Class, Classes begin 22 August	Print Lab 1	None	None
1	29 Aug	<b>Lab/Discussion:</b> Introduction to Microscopy & Basic Anatomy (Bacteria, Plant, Fungi, & Algae Parts)	Lab Activity 1	<b>Text:</b> Chapter 12; p.336 Section 2 (Kelps) & Fig. 15-19a; pp.298 (second paragraph)-299; pp. 530-532 & Fig. 22-6; Figs. 22-10, 22-11, 22-12, 23-4, 25-8, 25-13 <b>Print and Read Lab Activity 1</b>	None
2	5 Sep	<b>Lab/Discussion:</b> Introduction to Plant Diversity and Evolution Reading Scientific Papers	Lab Activity 2	<b>Text:</b> Chapter 12 <b>Paper:</b> ASPB 2013. <b>Print and Read Lab Activity 2</b>	None
3	12 Sep	<b>Lab/Discussion:</b> Greenhouse visit Overview of Prokaryotes Bacteria & Food Security Experiment, Data Collection, & Analysis	<b>Quiz 1</b> Lab Activity 3	<b>Text:</b> Chapter 13 -pp. 256-277 <b>Paper:</b> Sing Negi 2012 <b>Print and Read Lab Activity 3</b>	<b>Prepare for Quiz 1</b>
4	19 Sep	<b>Discussion:</b> Bacteria & Food Security Presentations & Peer Review	Bacteria Lab Peer Review	No reading for this week!	<b>Bacteria Lab Presentation</b> <b>Draft of Bacteria Lab Report</b>
5	26 Sep	<b>Lab/Discussion:</b> Algae-Diversity, Morphology, & Evolutionary Significance	Lab Activity 4	<b>Text:</b> Chapter 15	<b>Final Bacteria Lab Report</b>
6	3 Oct	<b>Lab/Discussion:</b> Harmful Algae Blooms (HABs) Experiment, Data Collection, & Analysis	<b>Quiz 2</b> Lab Activity 5 HABs Lab Report & Presentation	<b>Papers:</b> Chapman 2013; Paerl et al. 2014; Liu et al. 2013	<b>Prepare for Quiz 2</b>
7	10 Oct	<b>Discussion:</b> Harmful Algae Blooms (HABs) Presentations & Peer Review	HABs Lab Peer Review	No reading for this week!	<b>HABs Lab Presentation</b> <b>Draft of HABs Lab Report</b>
8	17 Oct	<b>Exam 1</b>	<b>Exam 1</b>	None	<b>Exam 1</b>



9	24 Oct	<b>Lab/Discussion:</b> Plants- Diversity, Morphology, & Evolutionary Significance	Lab Activity 6	<b>Text:</b> Chapter 26	<b>Final HABs Lab Report</b>
10	31 Oct	<b>Lab/Discussion:</b> Plants- Tree Ring Growth & Climate Change Experiment, Data Collection, & Analysis	<b>Quiz 3</b> Lab Activity 7	Marinelli 2003; Danielsen et al. 2009; Chapter 17; Brouwer et al. 2016 (not required)	<b>Prepare for Quiz 3</b>
11	7 Nov	<b>Discussion:</b> Plants- Tree Ring Growth & Climate Change Presentations & Peer Review	Lab Activity 8	Grace et al. 2002; Chapter 18; Jump et al. 2006 (not required)	<b>Tree Ring Growth &amp; Climate Change Presentations</b>
12	14 Nov	Angiosperms (Flower Types & Pollinator Syndromes)	<b>Quiz 4</b> Lab Activity 9	Ollerton et al. 2009; Chapter 19	<b>Prepare for Quiz 4</b>
13	21 Nov	Angiosperms (Fruit Types, Food Sources, and Food Security)	Lab Activity 10	Khoury et al. 2016; Chapter 20	<b>Final Gymnosperm Lab Report</b>
14	28 Nov	<b>Final Experiment Presentations</b>		None	<b>Final Experiment Presentations</b>
15	5 Dec	<b>Exam 2</b>	<b>Exam 2</b>	None	<b>Exam 2</b>

**This schedule is tentative and subject to change!**

*1 Sep - Last day to drop without a "W"; 5 Sep – Adjust hours for financial aid*

*14 Nov - Last Day to Drop with a "W" (WP/WF); 5 Dec - Last Day for a University Withdrawal*