

BIOL 1401, Section 001
BIOLOGY OF PLANTS
Fall 2022

Lecturer

Dr. Nick Smith
Experimental Sciences Building (ESB) II Rm. 402D
806-834-7363
nick.smith@ttu.edu

Office Hours

By appointment (contact Dr. Smith at nick.smith@ttu.edu)

Teaching Assistants (TAs)

Monika Kelley – monikell@ttu.edu
Zinny Ezekannagha – eezekann@ttu.edu
Eve Gray – evegray@ttu.edu
Snehanjana Chatterjee – snchatte@ttu.edu

Time

M/W/F 10:00 – 10:50

Location

Biology 101

Recommended Texts

Stern's Introductory Plant Biology 14th Edition by Bidlack and S.H. Jansky.
A Photographic Atlas for the Botany Laboratory, 7th ed., Rushforth et al.

Lab Manual

Available on Blackboard.

Daily materials

Slides and lecture reviews will be posted on Blackboard.

Grades

Grades will be posted on Blackboard. See scoring breakdown below.

Tutorial Assistance

<http://www.depts.ttu.edu/soar/LC/Index.php>

Schedule of Topics

<u>Date</u>	<u>Lecture Topic (Chapter #)</u>
<i>August</i>	
26	Plant Biology and Nature of Life (1, 2)
29	Plant Cells and Tissues (3, 4)
31	Plant Cells and Tissues (3, 4); Quiz #1
<i>September</i>	
2	Plant Cells and Tissues (3, 4)
5	Roots and Stems (5, 6)
7	Quiz #2
9	NO CLASS
12	Roots and Stems (5, 6)
14	Leaves, Flowers, Fruits, and Seeds (7, 8); Quiz #3
16	Leaves, Flowers, Fruits, and Seeds (7, 8)
19	Exam 1 review
21	Exam 1, Wednesday, September 21
23	NO CLASS
26	Water; Transpiration and Translocation (9, 5)
28	Soils and Nutrients (9, 5); Quiz #4
30	Photosynthesis (10)
<i>October</i>	
3	Photosynthesis (10)
5	Photosynthesis (10); Quiz #5
7	Respiration (10)
10	Respiration (10)
12	Productivity, Efficiency, and Growth (11); Quiz #6
14	Productivity, Efficiency, and Growth (11)
17	Exam 2 Review
19	Exam 2, Wednesday, October 19
21	NO CLASS
24	Meiosis and Mitosis (12)
26	Genetics (13); Quiz #7
28	Evolution (15)
31	Evolution (15)
<i>November</i>	
2	Seed-free Plant Diversity (20, 21)
4	Seed Plant Diversity (22, 23); Quiz #8
7	Plant Ecology (25)
9	Plant Ecology (25); Quiz #9
11	NO CLASS
14	Exam 3 review
16	Exam 3, Wednesday, November 16
18	NO CLASS

21	NO CLASS
23	NO CLASS
25	NO CLASS
28	Global Change
30	Global Change; Quiz #10

December

2	Lab Report Discussion/Review
5	Final Exam Review

FINAL EXAM (Comprehensive, 101 Biology), 7:30-10:00 AM, Monday, December 12. PERMISSION TO TAKE THE FINAL EXAM AT ANY OTHER TIME WILL NOT BE GRANTED.

Attendance Policy

Attendance is not mandatory, but it is strongly recommended that students participate in all aspects of the course to perform well. As quizzes, exams, and in-class activities will be administered during the class period, attendance is necessary to obtain points for those assignments.

Missing a Quiz or an Exam

If you have a university function or severe illness that will cause you to miss a quiz or exam, **contact Dr. Smith before the quiz/exam**. Make-up exams are usually short-answer/essay questions with some multiple-choice statements.

Expected Learning Outcomes

Biology 1401 satisfies the requirements for a course in the Natural Sciences Core Education Curriculum. Students graduating from Texas Tech University should be able to explain some of the major concepts in the Natural Sciences and demonstrate an understanding of scientific approaches to problem solving, including ethics. In addition, it is expected that a student completing this class should be able to understand, construct, and evaluate relationships in plant science. Specifically, the student should understand:

1. the scientific method and how it is used in plant research
2. plant structure (anatomy) and its relationship to plant functions (physiology)
3. how basic plant functions are regulated by the plant
4. the diversity of plant life on Earth
5. plant interactions with environmental factors and how these factors influence ecosystem function

Specific Methods of Assessing Expected Learning Outcomes

Student performance will be assessed by primarily multiple-choice tests in the lecture. Quizzes will be a combination of short-answer, fill-in-the-blanks, and multiple-choice. In the lecture,

selected exam questions will assess for students' critical thinking ability and empirical and quantitative skills. Benchmark: 60% of students scoring correctly on each of those assessments.

1. In the lecture, learning outcomes will be assessed by the administration of three exams, weekly quizzes, and a comprehensive final exam.
2. In the laboratory, learning outcomes will be assessed by the evaluation of a research report, an oral presentation, daily activity assessments, and class participation.

Grading Policy

3 Exams	= 14% each
10 Quizzes	= 1% each
In-class points	= 4%
Laboratory	= 30%
Final Exam	= 14%

All quiz and exam scores will be posted on Blackboard

Quizzes

Short quizzes will generally be given each week except when an exam is given (see the schedule, above). Quizzes may consist of a mix of multiple choice and short answer questions.

Exams

Exams may consist of a mix of multiple choice and short-answer questions. The first three exams will cover material covered in lecture since the previous exam.

Final Exam

The final exam may consist of a mix of multiple choice and short-answer questions. The final exam will be comprehensive.

In-class points

Sporadically throughout the semester, in-class activities will be used to supplement lecture content. Points will be given for participation in these activities during the class period.

Laboratory

Please see lab section below for information about the lab and grade structure. Because BIOL 1401 can serve as partial fulfillment of the laboratory science requirement for the university, ***if you receive a score in the laboratory of 55% or lower, you automatically receive a final course grade of F.***

Determining Your Letter Grade:

A = 100-90; B = 89.9-80; C = 79.9-70; D = 69.9-60; F = \leq 59.9.

ALL GRADES POSTED AT THE END OF THE COURSE WILL BE FINAL, unless an error has been made in their calculation.

BIOL 1401 Is a Core Curriculum Course

BIOL 1401 satisfies one-half of the Texas Tech University Life and Physical Science Core Curriculum requirement. The lecture and especially the laboratory portions of the course satisfy many of the learning outcomes and methods of assessment required of a core curriculum course. The following Learning Outcomes, some from the Texas Higher Education Coordinating Board and some from Texas Tech University, must be included in all Life and Physical Science classes in the Core.

Texas Higher Education Coordinating Board and Texas Tech University Learning Outcomes and Methods of Assessment

Coordinating Board Objective 1. Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

Critical thinking involves the careful and thoughtful evaluation of an issue before forming an opinion. The lecture will often provide information about biological processes in a step-wise manner as examples of how conclusions are reached based on data gathered. In the lab, you will be required to develop an independent investigation of a question or problem that you pose involving plants.

Method of Assessment: Your critical thinking skills will be assessed in lecture by thought-based multiple-choice statements and short-answer questions. In the laboratory the assessment will be based on your presentation to the class of your research findings and on a written and orally presented report.

Coordinating Board Objective 2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication

To be understood and effective in your career endeavors, you must learn and perfect effective oral, visual, and written communication skills.

Methods of Assessment: In lecture, these skills will be assessed through your interaction with the instructor, TAs, and fellow classmates. The BIOL 1401 laboratory provides the mechanism to assess your progress in perfecting communication through your oral and written presentation of your research project.

Coordinating Board Objective 3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

The analysis of information, such as data from an experiment, and the synthesis of that information into a clear prognosis are critical to be successful in an information-loaded world. In lecture, key topics offer an opportunity for the class to understand the interpretation of information. Also, your research project will require that you not only generate data but also that you must analyze those data and interpret your results.

Methods of Assessment: Key multiple-choice statements in exams and quizzes will test these skills. In the laboratory, weekly lab exercises will provide practice in this endeavor, so that you should have sufficient skills to analyze, interpret, and disseminate your research results.

Coordinating Board Objective 4. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

In the laboratory, you will work on weekly exercises and the research project as a member of a group. Thus, it is critical that you attend lab and work well with your fellow group members to accomplish the laboratory goals.

Methods of Assessment: You will be graded in the laboratory not only based on your knowledge of the experiment but on your ability to work with other members of the team. A portion of your grade will be based on your participation within the group based on the group members' assessment.

TTU Student Learning Objective 1. Demonstrate knowledge of the scientific method and to contrast it with other ways of understanding the world

In lecture, key topics offer an opportunity for the class to understand the scientific method. Early exercises in the laboratory will address the fundamental process of the scientific investigation to gain new knowledge relative to simply knowing or “feeling” what that information might be. You will apply the methodology to your research project.

Methods of Assessment: Key questions/multiple-choice statements in lecture exams will test your understanding of the scientific method. Your research presentation and report will be used to assess your understanding in the laboratory.

TTU Student Learning Objective 2. Demonstrate knowledge of the tools and methods used by scientists to study the natural world

In lecture, key topics offer an opportunity for the class to understand the scientific methodology. In lab, you will use certain tools and methodologies, such as microscopy and some basic biochemical/biophysical analyses, to address some fundamental processes of plant biology.

Methods of Assessment: Your knowledge will be assessed based on key questions in lecture exams and quizzes as well as on your weekly lab assessments and the research report.

TTU Student Learning Objective 3. Explain some of the major theories in the Natural Sciences

In Biol 1401 lecture and lab, you will be exposed to principles of cell and tissue structure/function relationships, the fundamental principle of the control of cellular activity by the genetic code, some basic principles of the control of the interaction of organisms and their environment, and principles of the evolution of species from pre-existing species.

Methods of Assessment: Lecture exams and quizzes focus on these basic principles of biology and their theories.

TTU Student Learning Objective 4. Describe how Natural Sciences research informs societal issues, including ethics

Specific lecture topics relate to how biological research affects people and their societies. Through the process of performing your research project, you will be expected to provide data that you and your group generated. Through this process, you will learn the importance of ethics in science to our ultimate understanding of the natural world. The importance of performing science honestly will not only be stressed but will become quite obvious as the project progresses.

Methods of Assessment: Lecture exams and quizzes focus on these basic principles, and the quality of your lab research report will assess how honest you and your group have been.

Special Considerations

COVID-19 Safety Guidelines

The following information is the most recent available at the beginning of the 2022 Fall Semester.

- Although COVID-19 vaccinations are not mandated, Texas Tech strongly recommends that all students be vaccinated and receive a booster when eligible. The vaccines are safe and effective.
- Please visit the university's coronavirus (COVID-19) page for additional information about on-campus vaccination and testing schedules, reporting a positive test result, and submitting vaccination records: <https://www.depts.ttu.edu/communications/emergency/coronavirus/>.
- Face masks are strongly encouraged in classrooms and other public indoor settings on campus, including the Student Wellness Center.
- If you are sick or not feeling well, you should stay at your place of residence and wear a mask when around others. Do not attend class, work, or social functions. If you brought a COVID-19 home test kit, please use it to determine whether you are positive for the virus.
- For students living in an on-campus residence, a limited number of tests are available from Community Advisors in residence halls. Please reach out to yours virtually to request one.
- Students can also be tested at an on-campus site.
- Students who meet the qualifications can contact Student Health Services to schedule an appointment to be tested. All students in university housing should develop an action plan in the event they are required to self-isolate due to a positive COVID-19 diagnosis. This plan should include a location to complete the self-isolation, access to groceries/meal delivery, access to necessary medications, numbers of emergency contacts, and contact information for their preferred healthcare provider.
- All students (both vaccinated and unvaccinated) who have been identified as having a known exposure to a COVID-19 positive person should follow CDC guidance (<https://www.cdc.gov/coronavirus/2019-ncov/your-health/quarantine-isolation.html>), which says:
 - If you are exposed but **not** vaccinated or up to date on vaccinations and boosters:
 - Quarantine for at least five days.
 - Wear a well-fitting (preferably N95 or KN95) mask if you must be around others.
 - Do not travel.
 - Get tested at least five days after exposure.
 - If you are exposed and **are** up to date on vaccinations and boosters:
 - No quarantine is necessary unless you develop symptoms.
 - Get tested at least five days after exposure.
 - If you are exposed and have had confirmed COVID-19 within the past 90 days:
 - No quarantine is necessary unless you develop symptoms.
- Self-isolation for five days is required for all students (vaccinated or unvaccinated) who test positive for COVID-19. After the five-day isolation period, if the student is asymptomatic or their symptoms are resolving (fever free without the use of fever reducing medication for 24 hours), they may return to class/activities but should wear a face mask for an additional five days.

- Students who are positive should report the result. This generates a letter that you can provide to your professors and instructors, notifying them of your positive diagnosis.

Contingency statement regarding COVID-19

This course is being taught primarily in the face-to-face learning mode. The University will continue to monitor CDC, State, and TTU System guidelines in continuing to manage the campus implications of COVID-19. Any changes affecting class policies or delivery modality will be in accordance with those guidelines and announced as soon as possible. If Texas Tech University campus operations are required to change because of health concerns related to the COVID-19 pandemic, it is possible that this course will move to a fully online delivery format. Should that be necessary, students will need to have access to the Internet, a webcam, and microphone for remote delivery of the class.

Illness Based Absence Policy

If at any time during this semester you feel ill, in the interest of your own health and safety as well as the health and safety of your instructors and classmates, you are encouraged **not** to attend face-to-face class meetings or events. Please notify your instructors as soon as possible to ensure your absence for illness will be excused. You are strongly encouraged to visit with either Student Health Services at (806) 743-2848 or your health care provider. A “return to school” note from your provider will be required to return to class. You will still be responsible to complete within a week of returning to class any assignments, quizzes, or exams you miss because of illness.

Accommodations for disabilities

Any student who, because of a disability, may require special arrangements to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor’s office hours. Please note that instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact the Student Disability Services office in 130 Weeks Hall or call 806-742-2405.

Absence due to religious observance

“Religious holy day” means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

Absence due to officially approved trips and other activities

The person responsible for a student representing the University on officially approved trips should notify the instructor of the departure and return schedules in advance. For other

University-approved curricular and extracurricular activities, the instructor must be presented with verifiable documentation prior to the first absence. The student will not be penalized for the absence but is responsible for the material missed.

Valid reasons for missing an exam

Illness or injury, family emergencies, certain University-approved curricular and extra-curricular activities, and religious holidays can be legitimate reasons to be excused from a scheduled examination. In the case of illness or injury, confirmation from a physician, physician's assistant, a nurse-practitioner, or a nurse is required. Barring extraordinary circumstances, confirmation must be presented **prior to** a missed exam. Regarding family emergencies, you must provide verifiable documentation of the emergency. Unless the emergency is critical you should notify the instructor in advance. In cases of critical emergencies, you must notify the instructor within one week of your absence. For University-approved curricular and extracurricular activities, verifiable documentation must be presented to the instructor at least one week prior to the first absence. In the case of religious holidays, notify the instructor in writing of any potential conflicts in the first three weeks of class.

Civility in the Classroom

Texas Tech University is a community of faculty, students, and staff that enjoys an expectation of cooperation, professionalism, and civility during the conduct of all forms of university business, including the conduct of student–student and student–faculty interactions in and out of the classroom. Further, the classroom is a setting in which an exchange of ideas and creative thinking should be encouraged and where intellectual growth and development are fostered. Students who disrupt this classroom mission by rude, sarcastic, threatening, abusive or obscene language and/or behavior will be subject to appropriate sanctions according to university policy. Likewise, faculty members are expected to maintain the highest standards of professionalism in all interactions with all constituents of the university (www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php).

Academic Integrity

Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Reference: Texas Tech University Quality Enhancement Plan, Academic Integrity Task Force, 2010].

Policy on Copying on Quizzes and Exams

When it has been determined during a lecture quiz or exam that a student has been viewing or exchanging answers with another student, the students in violation will receive a grade of 0 for that exam.

TTU Resources for Discrimination, Harassment, and Sexual Violence

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, (806)-742-SAFE (7233), or file a report online at <https://www.depts.ttu.edu/titleix/>. Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: **TTU Student Counseling Center**, 806-742-3674, <https://www.depts.ttu.edu/scc/> (*provides confidential support on campus*). TTU Student Counseling Center 24-hour Helpline, 806-742-5555, (*assists students who are experiencing a mental health or interpersonal violence crisis; if you call the helpline, you will speak with a mental health counselor*). **Voice of Hope Lubbock Rape Crisis Center**, 806-763-7273, voiceofhopelubbock.org (*24-hour hotline that provides support for survivors of sexual violence*). **The Risk, Intervention, Safety and Education (RISE) Office**, 806-742-2110, <https://www.depts.ttu.edu/rise/> (*provides a range of resources and support options focused on prevention education and student wellness*). **Texas Tech Police Department**, 806-742-3931, <http://www.depts.ttu.edu/ttpd/> (*to report criminal activity that occurs on or near Texas Tech campus*).

LGBTQIA

Please contact the Office of LGBTQIA, Student Union Building Room 201, 806-742-5433, www.lgbtqia.ttu.edu. Within the Center for Campus Life, the Office serves the Texas Tech community through facilitation and leadership of programming and advocacy efforts. This work is aimed at strengthening the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community and sustaining an inclusive campus that welcomes people of all sexual orientations, gender identities, and gender expressions.

Creating Livable Futures

This class is part of a campus-wide initiative called Creating Livable Futures, which is sponsored in part by the Texas Tech Center for Global Communication. As such, one of our objectives is to prepare you to communicate, in a fully interdisciplinary and global way, the challenges posed by pressing issues that speak to our collective wellbeing and sustainability. You will be asked to translate and communicate the work of leading thinkers on sustainability, and to expand discussing those materials through research experience and experiential learning. These objectives will be met through your lab semester project.

Your progress in communicating about global issues will be evaluated according to the Center for Global Communication rubric, so you will be invited to participate in one or more Creating Livable Futures activities outside of class that will complement class content. Planned Creating Livable Futures activities include participating in and attending speaker events and conferences, edit-a-thons, blogging and publication opportunities, student organizations, a book club, and even small scholarship opportunities for research.

You'll be informed of relevant opportunities and activities as they arise over the course of the semester.

BIOL 1401
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Spring 2022
LAB SYLLABUS

Lecturer

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Teaching Assistants (TAs)

Monika Kelley – monikell@ttu.edu
Zinny Ezekannagha – eezekann@ttu.edu
Eve Gray – evegray@ttu.edu
Snehanjana Chatterjee – snchatte@ttu.edu

Location

BIOL 015 (basement of Biology building)

Section Information

Section 501: Tuesday 11:00 AM – 12:50 PM, Teaching Assistant: Monika Kelley
Section 502: Tuesday 2:00 PM – 3:50 PM, Teaching Assistant: Snehanjana Chatterjee
Section 503: Wednesday 11:00 AM – 12:50 PM, Teaching Assistant: Eve Gray
Section 504: Wednesday 2:00 PM – 3:50 PM, Teaching Assistant: Eve Gray
Section 505: Thursday 11:00 AM – 12:50 PM, Teaching Assistant: Monika Kelley
Section 506: Thursday 2:00 PM – 3:50 PM, Teaching Assistant: Snehanjana Chatterjee

Lab Coordinator

Zinny Ezekannagha (eezekann@ttu.edu)

Among other things, the lab coordinator will be responsible for handling and delivering make-up labs.

Office Hours

By appointment

Communication

Periodically, you will receive emails about important lab updates and reminders from your TA. These will be sent to your @ttu.edu email address. Please use this email address for all correspondence with your instructor.

Required Materials

1. *Lab Manual*. The lab manual is available on Blackboard.
2. *Lab Coat*. Disposable lab coats can be purchased for \$10 from the Texas Tech Association of Biologists at <https://techassobio-labsales.weebly.com/#/>. Coats can stay in the lab.

3. *Laptop or other personal computational device.* At least one group member, but ideally all members, should bring a laptop or tablet to each class to help with completion of the activities. Please let your instructor know if this will be an issue for your group. A smartphone may be used on some days.

Course Delivery Method

The lab course will be taught face-to-face in BIOL 015.

Attendance

Attendance is *the key factor* to success in the lab section of this course. Most assignments and activities will be administered and evaluated during class time. Unexcused absences will result in the loss of all points for that lab section. Excused absences can be made up. Excused absences include religious days, a death in the family, illness, mandatory attendance at a university extra-curricular function, or other serious instances. You must notify your lab TA *prior* to a planned absence. If you are suddenly ill, you must contact your TA the day you become ill. To be excused, you must present to your lab TA required documentation from your doctor, coach, dean, counselor, minister, funeral director, etc. on official letterhead.

To receive credit for the lab, you must make it up. Please coordinate with your TA and lab coordinator if you will need to make up that week's lab. Labs must be made up during the Friday of the week the lab was given.

Late Work

All assignments are due on the date assigned by your lab TA. Late assignments will not be accepted unless you have instructor permission.

Special Needs

Please notify your TA if you need any special accommodations in class such as preferential seating, note taking, extra time on exams, etc. Students will need to present appropriate verification from Student Disability Services. Students will be granted an excused absence for any religious holiday, but you must contact your TA beforehand in order to make arrangements to make up any work.

Academic Dishonesty

Dishonesty will not be tolerated. All students are expected to abide by the Code of Student Conduct (see your student handbook for the definition of cheating). As stated in the Texas Tech University catalog, "The attempt of any students to present as their own work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offense liable to serious consequences, possibly suspension."

Classroom Regulations

All students are expected to conduct themselves in a proper manner to provide a good learning environment for everyone. Any disruptions will not be tolerated. Such disruptions include but are not limited to: arriving late or leaving early; reading material not required for class; talking to neighbors or on phones; texting; eating or drinking; playing games on the computer or phone. Any disruptions will be dealt with immediately and reported to the proper authorities.

Per university policy, no food, drinks, or tobacco is allowed in the lab, even in waste bins. Your TA will check the lab tables before and after class. If drink bottles or food wrappers are found at your table, all lab members will receive a penalty in that day's participation points.

Per university policy, students must wear long pants, closed toe shoes, and lab coats while in the lab.

Expected Learning Outcomes

The course will be taught as a course-based undergraduate research experience (CURE) revolving around the role that plants play in the global climate system. For the CURE, students will work on finding an answer to the question "Do plants matter for climate?" It is expected that a student completing this laboratory class should be able to understand:

1. the scientific approach to developing knowledge
2. variability in data and methods for evaluating it
3. trends in environmental changes and drivers of these trends
4. the role plants play in the environment
5. the importance of and strategies for disseminating knowledge

Groups

Throughout the semester students will work in groups of 4. Groups will be maintained over the course of the semester. Please see your TA if there are issues among the group.

Methods of Assessing Learning Outcomes

Learning outcomes will be assessed by the following (percentages reflect percentage of total lab score):

1. **Daily Assignments** (50%). Throughout the semester students will be given 10 Daily Assignments, each of which will constitute 5% of the total lab grade. They are each designed to be completed during the lab period with assistance from the TA and other lab members. The nature of these assignments will vary from week to week. Assignments will be due at the start of the following week's lab section.
2. **Section Drafts** (20%). Throughout the semester students will be asked to produce 4 Section Drafts, each of which will constitute 5% of the total lab grade.
3. **Final Paper** (20%). At the end of the semester students will use their section drafts to build a complete research paper.
4. **Final Presentation** (5%). At the end of the semester students will give a ~10 minute presentation of their final project. Each group will give a single presentation.
5. **Group member assessment (Peer Evaluation)** (5%). Each group member will be asked to assess the effort and contributions from the other group members to the section drafts, final paper, and final presentation.

Schedule

The course will be taught as a CURE divided into 4, 3-week modules grouped around the main sections of a scientific paper (Introduction, Methods, Results, Discussion).

Module 1: Introduction

- August 30-September 1 (Lab 1 and Lab 2): Syllabus discussion, Introduction to global change and the class experiment, reading and searching for scientific literature
 - Assignment: **Daily Assignment #1** and **Daily Assignment #2**
- September 6-8 (Lab 3): Continued discussion of global change and the class experiment, developing a question and hypothesis
 - Assignment: **Daily Assignment #3**
- September 13-15 (Lab 4): Writing your Introduction section
 - Assignment: **Section Draft #1**

Module 2: Methods

- September 20-22 (Lab 5): Techniques to measure plant traits part 1
 - Assignment: **Daily Assignment #4**
- September 27-29 (Lab 6): Techniques to measure plant traits part 2
 - Assignment: **Daily Assignment #5**
- October 4-6 (Lab 7): Experimental design and writing your Methods section
 - Assignment: **Section Draft #2**

Module 3: Results

- October 11-13 (Lab 8): Experimental measurement day
 - Assignment: **Daily Assignment #6**
- October 18-20 (Lab 9): Data analysis and visualization
 - Assignment: **Daily Assignment #7**
- October 25-27 (Lab 10): Writing your Results section
 - Assignment: **Section Draft #3**

Module 4: Discussion

- November 1-3 (Lab 11): Connecting your Introduction and Results sections, What have we found and what does (and doesn't) it mean?
 - Assignment: **Daily Assignment #8**
- November 8-10 (Lab 12): Writing your Discussion section
 - Assignment: **Section Draft #4**

Dissemination

- November 15-17 (Lab 13): The why and how of knowledge dissemination
 - Assignment: **Daily Assignment #9**
- November 22-24: **NO LAB**
- November 29-December 1 (Lab 14): Final presentations
 - Assignment: **Daily Assignment #10, Final Paper, and Peer Evaluations**