Textbook and/or Resource Material
Lab: Lab Assignment Protocols given out in lab by instructor.

Course Description and Prerequisites
Physiology of plants, cell structure and function, nutrition, metabolism and factors influencing growth and development. Prerequisite: 6 hours of Biology.

Learning Objectives/Outcomes for the Course
In this course, you will develop the following specific competencies in plant physiology:

- Knowledge of plant cell architecture, water balance, cell walls
- Knowledge of photosynthesis, respiration, metabolism
- Knowledge of plant growth, development, reproduction
- Knowledge of nutrient acquisition, nutrient transport, cell signaling, stress

In addition, you will develop a “toolbox” for doing plant physiological research:

- Learn some common methods and techniques used in plant physiology
- Learn how to search and use the scientific plant physiology literature

Learning Objectives for Core Curriculum Requirements
1. Role of the Cell:
The Biology graduate knows the role of the cell in life and living systems, and understands the interrelationships among subcellular structures that contribute to its functioning as a unit.

2. Role of Genetics:
The Biology graduate understands the role of genetics in inheritance and can explain how environmental conditions influence natural selection processes and contribute to adaptation.

3. Diversity of Life:
The Biology graduate is aware of the diversity of life and interrelationships between an organism and its environment.

4. Structure and Function:
The biology graduate understands how the organization of a specific structure within an organism is related to a specific function, understands interrelationships among organs and organ systems within an organism, and how interaction between structure and function contribute to the survival of the organism.

5. Scientific Method:
The biology graduate understands the Scientific Method, is able to analyze and interpret data, and communicate research findings in both oral and written form.

Important Dates during the Semester
The UTRGV academic calendar can be found at https://my.utrgv.edu/home at the bottom of the screen, prior to login. Some important dates for spring 2019 include:

January 14       First day of classes
January 17       Last day to add a course or register for spring 2019
January 21       Martin Luther King Jr. Day – NO classes
April 10         Last day to drop a course; will count toward the 6-drop rule
April 19-20      Easter Holiday – NO classes
May 2       Study Day – NO classes
May 3-9     Final Exams
May 10-11   Commencement Exercises

Calendar of Activities (subject to change)

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>Book Chapters</th>
<th>Due in Lab</th>
<th>Pre-lab</th>
<th>Lab Topic</th>
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</thead>
<tbody>
<tr>
<td>January 16, 2019</td>
<td>Course Overview</td>
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<tr>
<td>January 23, 2019</td>
<td>Plant Architecture &amp; Water Relations</td>
<td>1, 2</td>
<td></td>
<td></td>
<td>Stem anatomy and functional trait trade-offs (data analysis lab; MEET IN EACS 2.148)</td>
</tr>
<tr>
<td>January 30, 2019</td>
<td>Water Relations, (cont.)</td>
<td>2, 3</td>
<td>Worksheet</td>
<td>(individual)</td>
<td>Rotating Stations - Overview of Instrumentation</td>
</tr>
<tr>
<td>February 6, 2019</td>
<td>Photosynthesis</td>
<td>9, 7</td>
<td>Quiz</td>
<td></td>
<td>Rotating Stations *</td>
</tr>
<tr>
<td>February 13, 2019</td>
<td>Photosynthesis (cont.), Respiration</td>
<td>8, 11</td>
<td>Data analysis</td>
<td>Quiz</td>
<td>Rotating Stations *</td>
</tr>
<tr>
<td>February 20, 2019</td>
<td>Exam 1</td>
<td>1, 2, 3, 7, 8, 9, 11</td>
<td>Data analysis</td>
<td>Quiz</td>
<td>Rotating Stations *</td>
</tr>
<tr>
<td>February 27, 2019</td>
<td>Phloem Transport</td>
<td>10</td>
<td>Data analysis</td>
<td>Quiz</td>
<td>Rotating Stations *</td>
</tr>
<tr>
<td>March 6, 2019</td>
<td>Mineral nutrition &amp; nutrient assimilation</td>
<td>4, 5</td>
<td>Data analysis</td>
<td></td>
<td>Mineral Nutrition Setup</td>
</tr>
<tr>
<td>March 13, 2019</td>
<td>SPRING BREAK</td>
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<tr>
<td>March 20, 2019</td>
<td>Signaling 1</td>
<td>12, 14</td>
<td></td>
<td></td>
<td>Group work on projects (analysis)</td>
</tr>
<tr>
<td>March 27, 2019</td>
<td>Signaling 2</td>
<td>13, 15</td>
<td>Group</td>
<td>Presentations</td>
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<tr>
<td>April 3, 2019</td>
<td>Exam 2</td>
<td>10, 4, 5, 12, 13, 14, 15</td>
<td></td>
<td></td>
<td>Mineral Nutrition Harvest</td>
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<tr>
<td>April 10, 2019</td>
<td>Growth &amp; Senescence</td>
<td>16</td>
<td>Mineral nutrition report (Group)</td>
<td>TBD</td>
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<tr>
<td>April 17, 2019</td>
<td>Flowers &amp; Fruits</td>
<td>17</td>
<td></td>
<td></td>
<td>Herbivore induced plant volatiles: Collection</td>
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<tr>
<td>April 24, 2019</td>
<td>Biotic Interactions</td>
<td>18</td>
<td></td>
<td></td>
<td>Herbivore induced plant volatiles: Analysis</td>
</tr>
<tr>
<td>May 1, 2019</td>
<td>Abiotic Stress</td>
<td>19</td>
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<td></td>
<td>TBD</td>
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<tr>
<td>May 8, 2019</td>
<td>Exam 3 (Final)</td>
<td>16, 17, 18, 19</td>
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* Stations include gas exchange (Aci and light curves), pressure chamber (water potential), and osmometry

Grading Policy

Your grade for this course will be equally weighted by your laboratory and lecture grades (50/50).

Grading breakdown - LECTURE

<table>
<thead>
<tr>
<th>Grading breakdown - LECTURE</th>
<th>Percentage</th>
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<tr>
<td>Popular Science Topic Presentation</td>
<td>10</td>
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<tr>
<td>Pop in-class quizzes</td>
<td>20</td>
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<tr>
<td>3 Exams</td>
<td>60</td>
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<tr>
<td>Attendance &amp; Participation</td>
<td>10</td>
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Grading breakdown - LAB

<table>
<thead>
<tr>
<th>Grading breakdown - LAB</th>
<th>Points</th>
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<tbody>
<tr>
<td>Stem anatomy lab worksheet (Individual)</td>
<td>5</td>
</tr>
<tr>
<td>Pre-lab quizzes 4 @ 5 points each (Individual)</td>
<td>20</td>
</tr>
<tr>
<td>Rotating Station data analyses: 4 @ 5 points each (Individual)</td>
<td>20</td>
</tr>
<tr>
<td>Rotating Station: Cross-cutting science presentation (Group)</td>
<td>25</td>
</tr>
</tbody>
</table>
Final Grade = (Lecture Grade) * 0.5 + (Lab Points)/90 * 100 * 0.5
100-90 A  89-80 B  79-70 C  69 and below F

What to Expect

This is an intense course covers the fundamental, core concepts in plant physiology. Realistically, there is much more material than we can cover in one semester. My philosophy is to cover the main topics in depth and just brush over other topics. Where possible, I will try to link topics together with common themes to promote an integrated understanding of plants. To quote from a colleague of mine (Anna Sala, U Montana): “Students generally like this course, but they invariably say that it is hard. Two main reasons make it hard: 1) there is an incredible amount of basic, core material to cover in an introductory plant physiology course; and 2) the material is inherently difficult and complex because it deals with thermodynamics, organic chemistry, cellular biology, molecular biology and a long array of disciplines that are not necessarily intuitive. My point is not to discourage students, but simply to alert students that this is a course that requires commitment. Studying the day before the exam will most likely not be enough. However, if you prepare correctly, you have a high chance to do well. You should know that this course will require a degree of factual memorization on your part. Generally, if you do not know the facts, then there is little to understand. Therefore, knowing the facts precedes understanding.”

Course Details

Lecture

Popular Science Topic Presentation:

Once this semester, you will individually make one short (5-minute, 1-2 slide) oral presentation over a popular science article or science news article that relates to some aspect of plant physiology, ideally on topic with the subject of that day’s lecture. I will grade you on the basis of the relevance of your topic to plant physiology & clarity of your presentation. Good sources for these types of articles are: BMC, Nature News, Science News, American Society of Plant Biologists (ASPB), Scientific American, National Geographic, NPR, Wired, and many others. If you have any doubts, feel free to ask. Your 1-2 slides are due by email to me by 12pm the day before class (Tuesday).

Pop In-Class Quizzes

Periodically throughout the semester, I will give you a short multiple-choice quiz to promote your attentiveness and participation during lecture, and to discourage cramming for exams. These will generally be unannounced and will cover main topics or concepts in either a previous week’s lecture or a lecture for an existing class.

Exams

Exams will consist of a mix of short essay, fill-in-the blank (usually diagrams), and multiple choice. There will be 3 exams, the last of which will occur on the final exam day but will not be comprehensive.

Attendance & Participation

Self-explanatory! Come to class, and ask questions and respond to questions!

Laboratory

Come prepared: Weekly laboratory exercises will complement information presented in class. I will provide the necessary background information as required pre-lab material for you to review. It is your responsibility to review the pre-lab material (in some cases, a video) before lab, or you will feel lost!

4 weeks of “Rotating Through Stations” culminating in a group presentation using the pooled class dataset: In this group of labs (see lab schedule), you will be split in groups across 3 different stations:
- **Leaf gas exchange** (2 weeks covering photosynthesis, transpiration, respiration via generation of ACi curves),
- **Plant water potential** (1 week covering PV curve generation & desiccation tolerance), and
- **Osmometry** (1 week covering leaf osmotic potential).

Each station will have a different instrument, protocol, and concepts. You will develop a ‘physiological profile’ of an assigned plant species as you work through these stations. You will work in teams to collect and record data, but will individually submit a data analysis the following week. At the end of the 4 weeks, I will pool the data collected by the entire class across all species and you will address a scientific question using this pooled dataset, to be presented in lab 3 weeks later. This group of labs serves three purposes:

- providing hands-on exposure to state-of-the-art instruments
- learning core concepts in plant water relations, photosynthesis, and respiration
- learning about research by actively doing research

The **UTRGV College of Science Educational Fund** made these labs possible. Your main responsibility to ensure these lab data collection modules are a success is to review your group’s assigned pre-lab material before coming to lab (readings and/or videos). Pre-lab quizzes will be over any pre-lab material to ensure that you come prepared.

**Remaining Set of Labs:** Other labs will focus on aspects of anatomy, mineral nutrition, and plant defense. The first lab report on anatomy and functional trait trade-offs will be an individual report, and mineral nutrition and plant defense (volatiles) will be group reports. I will provide further details about the content of these lab reports as the time approaches. In most cases it will consist of a written summary of the scientific question, objectives, methods, your role within your group, a set of figures summarizing the results, any conclusions you can draw from these results.

**UTRGV Policy Statements**

**STUDENTS WITH DISABILITIES:** Required on all syllabi. Do not modify.

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact **Student Accessibility Services (SAS)** as soon as possible to schedule an appointment to initiate services. Accommodations can be arranged through SAS at any time, but are not retroactive. Students who suffer a broken bone, severe injury or undergo surgery during the semester are eligible for temporary services.

**Pregnancy, Pregnancy-related, and Parenting Accommodations**

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting (reasonably immediate postpartum period) are encouraged to contact Student Accessibility Services for additional information and to request accommodations.

**Student Accessibility Services:**

**Brownsville Campus:** Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at ability@utrgv.edu. **Edinburg Campus:** Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at ability@utrgv.edu.

**MANDATORY COURSE EVALUATION PERIOD:**

Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account ([http://my.utrgv.edu](http://my.utrgv.edu)); you will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades. Online evaluations will be available on or about:

- **Module 1** February 13 – 19
- **Module 2** April 10 – 16
- **Full Fall Semester** April 10 – May 1
ATTENDANCE: Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV’s attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations. **Because this class meets only once per week, I will only allow for 1 excused lecture absence for the semester. Any subsequent absences will result in a loss of 5 points off your final grade.** Unfortunately, due to the nature of the course, laboratories cannot be made up.

SCHOLASTIC INTEGRITY:
As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism (including self-plagiarism), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

SEXUAL HARASSMENT, DISCRIMINATION, and VIOLENCE:
In accordance with UT System regulations, your instructor is a “Responsible Employee” for reporting purposes under Title IX regulations and so must report any instance, occurring during a student’s time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at [www.utrgv.edu/equity](http://www.utrgv.edu/equity), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct and discrimination.

COURSE DROPS:
According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the “3-peat rule” and the “6-drop” rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

STUDENT SERVICES:
Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Students Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email (ucentral@utrgv.edu) or telephone: (888) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.

Students seeking academic help in their studies can use university resources in addition to an instructor's office hours. University Resources include the Learning Center, Writing Center, Advising Center and Career Center. The centers provide services such as tutoring, writing help, critical thinking, study skills, degree planning, and student employment. Locations are:
- Learning center: BSTUN 2.10 (Brownsville) or ELCTR 100 (Edinburg)
- Writing center: BLIBR 3.206 (Brownsville) or ESTAC 3.119 (Edinburg)
- Advising center: BMAIN 1.400 (Brownsville) or ESWKH 101 (Edinburg)
- Career center: BCRTZ 129 (Brownsville) or ESSBL 2.101 (Edinburg)