Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: BOT
Course and Section #: 4100-001
Course Title: Plant Anatomy
Credits: 3

Course Description

Covers the structure and development of cells, tissues and tissue systems in stems, roots,
leaves, and reproductive structures in vascular plants, with emphasis on the angiosperms.
Discusses primary and secondary plant body, including wood anatomy. Includes weekly
laboratory.

Course Attributes

This course has the following attributes:
☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☒ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Michael C. Rotter

Student Learning Outcomes

Differentiate plant anatomical positional and directional terms.
2 Summarize plant cell structure and function as they relate to plant productivity and growth.
3 Appraise the origin, development, and variation in structure of primary and secondary cell walls and how wall structure correlates to physical characteristics.
4 Differentiate parenchyma, collenchyma, and sclerenchyma cell and tissue types and the dermal, vascular, and ground tissue systems.
5 Contrast the structure and activity of the root and shoot primary meristems, the maturation of their derivatives, and resulting mature primary anatomy of roots, stems, and leaves.
6 Interpret the origin and structure of the vascular and cork cambia and how these produce the secondary plant body, including the structure of secondary xylem, phloem, and

periderm and variations as observed in woody plants.
7 Evaluate the origin, development, and structure of secretory structures as they relate to their importance to ecosystem functions and human use.
8 Correlate anatomical structures with their functions and variations that have evolved in particular habitats such as aquatic, mesic, and xeric habitats.
9 Interpret the anatomy of reproductive structures as they relate to plant evolution

Course Materials and Texts

Crang, R., Lyons-Sobaski, S., & Wise, R. (2018). Plant anatomy: a concept-based approach to the
structure of seed plants. Springer.
• You will need a copy of this book (either physical or an ebook). We will be reading and using it
extensively. You will want to bring a copy of this to all labs. If you're a botany major, I would buy
a copy for reference, but you can also rent it.
Various peer reviewed journal articles
• These will be provided on canvas as PDF links. Students are expected to read the articles and be
able to discuss findings and ask questions related to the reading.
A photographic Atlas for the Botany Laboratory (7th edition), Rushforth, Robbins, Crawley, and Van Dr
Graaff
• This is an optional book for this course. This book is excellent at supplying great photos and
illustrations that provide detail for many of the concepts we will be going over during the semester. I will have copies available during the labs. If you are a botany major this would be a
recommended text for your bookshelf (I still use my 5th edition version). The taxonomy is out of
date

Course Requirements

Course Assignments, Assessments, and Grading Policy
Grading Scheme
A: 94%, A-: 90, B+: 86, B: 83, B-: 80, C+: 76, C: 73, C-: 70, D+: 66, D: 63, D-: 60, E: below 60
Assignments as percentage of overall grade:
Professional Points.....5%
Check in Quiz.....15%
Laboratory/ Lecture Assignments.....15%
Lecture Participation..... .....20%
Plant Anatomy Study.....20%
Plant Anatomy Atlas.....25%
Professional Points (5%)

Being a good botanist, biologist, and/or citizen of the planet means working hard with an understanding
for the care of those around us. Because these skills are essential to our lives, I will consider these
aspects of course work as professional points. Students should communicate regularly and professionally with me and their peers. This includes simple things such as communicating in a
professional tone, asking good questions when appropriate, submitting assignments that have had
thought put in them, and approaching the course with an open mind. These points will also reflect the
tone you take with other students in the class and your interactions with each other. All students will
receive the entire points and they will be deducted at my discretion.

Lecture Participation (20%)

Most lectures will feature an open discussion about the assigned readings and the lecture material.
Students will need to come prepared by being able to demonstrate they have read the material by
asking questions or discussing key points. In addition, good discussion etiquette must be kept. Students
are expected to allow others to have the ability to contribute and be respectful to their peers by paying
attention.
Weekly points will be given based on participation and etiquette (your two lowest weekly grades will be
dropped). A total of 10 points can be earned each week. Class comments are graded qualitatively at my
discretion.
Weekly grading rubric:
0 Student absent, no communication, or questions demonstrating lack of preparation.
1 Student responds to a survey or question.
2 Student has some reasonable questions but low on substance.
3 Student participates but small effort of self-learning.
4 Student ask question to further their own understanding.
5 Student asks questions to spur class discussion and actively participates.

Check in Quiz (15%)

This is a weekly quiz due the night before our discussion. It will cover lecture reading, material, and the
paper we will be discussing. The idea will be to allow for the student to check in on their understanding
of the topics and to demonstrate a knowledge of the paper before going into the discussion.

Lecture/Laboratory Assignments (15%)

Occasional short essays, quizzes, and other work will be assigned. These will be once to twice a week

and will mostly be assigned to further clarify points and to practice hands on skills. Some of these
assignments may be given without advanced notice.
Plant Anatomy Study (20%)
Students will need to complete a quantitative experiment involving plant anatomy. Each student will
need to submit, individually, a short proposal outlining their hypothesis and how they aim to complete
the project. Students will then be placed into groups with students that had proposed similar projects
and will consult with the instructor on creating a doable project. Each project will be presented to the
class as a poster. See Plant Anatomy Study Instructions on Canvas.
Plant Anatomy Atlas (25%)
Students will be tasked to create their own "book" exploring the anatomy of a plant of their choice.
These will be based on plants that the students will grow or care for themselves. The atlas will require
students to section various parts of their plants they grow and take pictures of anatomical structures.
Pictures (or drawings) will need to be digitized and uploaded as students will need to label the pictures
and submit the assignment as a PDF. See Plant Anatomy Atlas instructions on Canvas

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Required or Recommended Reading Assignments
See below

General Description of the Subject Matter of Each Lecture or Discussion
Daily Schedule – Schedule is subject to change. Days in **blue** are paper discussion days, days in **green** are lab days. **Purple** are days we will not be meeting.

Date	Topic	Text Chap.	Paper Reading	Assignments Due
1.6	Course Introduction		How to read an article, How to (Seriously) read an article	What do you know about plants?
1.8	What are plants?	1		
1.9	Lab: Choosing and Starting Plants			Atlas Plant Choice
1.10	Why do plants do what they do?		Bowman 2022	Quiz #1
1.13	The Plant Cell	3		
1.15	Plastids	3		
1.16	Lab: Microscope Skills			Microscope Guide
1.17	Trapped in a cell		Sibbald and Archibald 2020	Quiz #2

				Anatomy Study: Individual Proposal
1.20	**No Class- MLK Jr Day**			
1.22	Plant Growth: Mitosis and Meristems	4		
1.23	Lab: Plants in 3D space and Stains			Staining guide, plants in 3D space
1.24	Merry Meristems		Schoen and Schultz 2019	Quiz #3
1.27	Cell Walls	5		
1.29	Plant Cell Types	6		
1.30	Lab: Plant Cells			"Enchyma" Catalogue
1.31	Cell wall and tissue evolution		Anderson and Kieber 2020	Quiz #4 Plant Study Group Proposals
2.3	Xylem part I	7		
2.5	Xylem part II	7		
2.6	Lab: Open Lab			Plant Atlas Check In #1
2.7	Playing the Xylem(phone)		Matthaeus et al 2022	Quiz #5 Plant Study Group Rubrics
2.10	Phloem	8		
2.12	Phloem Plumbing Puzzle			
2.13	Lab: Open Lab			
2.14	Going with the phloem		Will et al 2013	Quiz #6
2.17	**No Class – Presidents Day**			
2.19	Epidermis	9		
2.20	Lab: Chemical Assays Prep			
2.21	Plants Secretory Structures	13		
2.24	Herbivores and Anatomy		Carmona et al 2015	Quiz #7
2.26	Plant Herbivore Defense!			
2.27	Lab: Chemical Assays Continued			Chemical assay maps
2.28	**No Class- UCUR**			Anatomy Study Literature Reviews
3.3	Roots	10		
3.5	Shoots (Stems)	11		
3.6	Lab: Open Lab			
3.7	Root:Shoots		Ye et al 2021	Quiz #8

				Plant Atlas Check in #2
3.10-3.16	**Spring Break**			
3.17	Leaves: Form	12		
3.19	Leaves Function	12		
3.20	Lab: Photosynthesis Sections			Photosynthesis Sections
3.21	Leaf Peeping		Maeda and Fernie 2021	Quiz #9
3.24	Vascular Cambium	14		
3.26	Periderm	16		
3.27	Lab: Open Lab			
3.28	What's up dog? Bark!		Birke et al 2018	Quiz #10
3.31	Wood: Morphology	15		
4.2	Wood: Architecture	15		
4.3	Lab: Wood Lab			Wood Sections Plant Atlas Check in #3
4.4	How much wood would a wood chuck chuck?		Rybczynski 2008	Quiz #11
4.7	Reproductive Anatomy	17,18		
4.9	Fruits, seeds, and seedlings	19		
4.10	Lab: Open Lab			
4.11	Let's talk about sex		Vallejo-Marin and Russell 2023	Quiz #12 Plant Study Data Analysis
4.14	Plant Anatomy and Ethnobotany		Zumbroich 2009	Quiz #13
4.16	Plant Anatomy and Agriculture		Okimoto 1948	Quiz #14
4.17	Lab: Open Lab			
4.18	Plant Anatomy and Conservation		Terry and Mauseth 2006	Quiz #15
4.21	Open day – wrap up projects			
4.23	**No Class Interim Day**			
4.24-4.30	**Finals Week – Wednesday April 30th 9am-11am**			Final Plant Atlas Final Group Poster Poster Conference

Required Course Syllabus Statements

Generative AI
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Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX
Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation
UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.
To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.