

BIOL 325, Plant Systematics, Fall 2019

Course Web: <http://herbarium.millersville.edu/325.php>

Lecture: T & R 1:10-2:00, Roddy 258 **Lab:** T 2:10-5:00, Roddy 268

Instructor: Dr. Chris Hardy Office Hrs: Roddy 271, W & F 9:30-11:30, R 3-4
Tel: 871-4317 Web: <http://herbarium.millersville.edu/hardy.php>

Required:

1. Rhoads, AF, and TA Block. 2007. *The Plants of Pennsylvania: An Illustrated Manual, 2nd Edition*. University of Pennsylvania Press. (ISBN: 0-8122-4003-0)
2. Hand magnifying lens (10x is appropriate, but not higher than 20x).
3. Preparedness for the out-of-doors, rain, snow or shine, during all Tuesday meetings of lecture and laboratory. Be prepared to depart to the field even during lecture time on Tuesdays.

Suggested:

1. Three-ring binder(s) in which to insert lecture and lab handouts, and notes taken on looseleaf paper.
2. Camera.
3. Hand pruners.

Objectives: At the successful completion of BIOL 325, a student should be able to

1. list key characteristics of and recognize major vascular plant taxa, as well as selected genera;
2. list characteristics of larger groups such as vascular plants, lycophytes, ferns, gymnosperms, angiosperms, dicots, and monocots; to be able to draw a cladogram showing how these larger groups are related to one another;
3. use and construct dichotomous keys to plant taxa;
4. use a hand lens and a dissecting scope to dissect and make detailed observations of plant parts;
5. outline the basic hierarchy of taxonomic ranking;
6. list and explain the fundamental rules of botanical nomenclature;
7. explain what herbaria are and what their functions are;
8. outline the basic tenets of cladistics and the implications of cladistic thinking for taxonomy;
9. use simple algorithms and cladistics methodology to test evolutionary hypotheses;
10. list the types of data collected by systematists for the construction of classifications.

Grading: Final letter grades are earned on basis of percentage of total points available as follows (A = 93-100%; A- = 90<93; B+ = 87<90; B = 83<87; B- = 80<83; C+ = 77<80; C = 73<77; C- = 70<73; D+ = 67<70; D = 63<67; D- = 60<63; F = <60%).

Lecture Exam 1 (Unit topics plus unit families)	50
Lecture Exam 2 (Unit topics plus unit families)	50
Final Lecture Exam (1/3-1/2 cumulative, all topics, all families)	75
Plant Collection Project	50
Lab quizzes / keys	60
<u>Lab Final (cumulative)</u>	<u>50</u>
Total points possible	335

Special Needs: Please let me know if you have any disabilities or special needs that might affect your performance in this course. I will do my best to accommodate you.

Readings: Will be announced in class. You are responsible for all content in the assigned readings.

Attendance: Attendance of laboratories and field trip(s) is required.

Attendance of lectures is optional, but you are responsible for all information discussed or homework assigned in class.

Missed lecture exams may be made up as an essay exam with a valid excuse (doctor's note or

proof of family emergency).

There will be no make-ups for missed lab quizzes.

Honesty: No cheating on tests, plagiarism, or cut-&-pasting from electronic sources on any assignment.

Title IX Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment, comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, et seq., and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.

Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at <http://www.millersville.edu/sexualviolence/index.php>.

Lecture Schedule

<u>Lecture Topic</u>	<u>Special Comments / Your Notes</u>
Week 1: Aug 27 & Aug 29 Topic 1 - Introduction	
Week 2: Sep 03 & 05 Topic 2 - PA Floristics	
Week 3: Sep 10 & 12	
Week 4: Sep 17 & 19 Topic 3 - The Code	
Week 5: Sep 24 & 26	
Week 6: Oct 01 & Oct 03 Exam 1	
Week 7: Oct 08 & 10 Topic 4 - History - Plant Systematics	
Week 8: Oct 15 & 16 Fall Break (Tuesday only)	
Week 9: Oct 22 & 24	
Week 10: Oct 29 & Oct 31 Topic 5 - Cladistics	Plant Collection Project due Nov 1, 5 pm
Week 11: Nov 05 & 07 Exam 2	
Week 12: Nov 12 & 14	
Week 13: Nov 19 & 21	
Week 14: Nov 26 & 28 Topic 6 - Molecular Systematics T-day Recess	
Week 15: Dec 03 & 05	
Week 16: Dec 10 (T) Final Exam, 12:30-2:30	

Lab Schedule

<u>Lab Topic</u>	<u>Notes</u>
Week 1: Aug 27 Basal Angiosperm Grade	
Week 2: Sep 03 Monocots, part 1	Pressing Plants and NatureAtlas Demo
Week 3: Sep 10 Basal Eudicot Grade & Caryophyllids	Quiz 1
Week 4: Sep 17 Rosids, part 1	
Week 5: Sep 24 Asterids, part 1	Quiz 2
Week 6: Oct 01 Rosids, part 2	
Week 7: Oct 08 TBA	Quiz 3; Mounting Herbarium Specimens Demo
Week 8: Oct 15 Fall Break	Fall Break
Week 9: Oct 22 Rosids 3 & Asterids 2	
Week 10: Oct 29 Monocots 2	Quiz 4; Plant Collection Project due Nov 1, 5 pm
Week 11: Nov 05 Asterids 3	
Week 12: Nov 12 Pteridophyte Grade	Quiz 5
Week 13: Nov 19 Gymnosperms	
Week 14: Nov 26 Monocots 3	Quiz 6
Week 15: Dec 03 Lab Final Exam	Lab Final Exam

Plant Collection Project

Plant collecting and the preparation of herbarium specimens lie at the heart of systematics and its major endeavors of (1) discovering and naming species and (2) documenting a region's flora and monitoring the health of it and its component species. In order to gain experience in this important and practical skill, this project asks you to make collections and preparations of 10 herbarium specimens (to total 10 separate species) from wild plants. The specimens can be from any *wild* population in the world, although there are important restrictions on which populations as described below. All materials (the physical, mounted specimens, photographs, and their mapping on www.natureatlas.org, hereon as NA) are due in two months' time at 5 pm on Nov 1 (late projects deducted 10% per 24 hr period).

A. Important Notes Regarding Academic Honesty:

1. Work to identify these alone.
2. Do not team up with others to collect the "same" things. Although you can go out into the field with a classmate as a travel companion, you cannot collect the same species from those localities, and you cannot help each other with the identifications.

B. Important Procedural Notes:

1. You must keep a field notebook that describes all necessary information and this information must be taken at the time of collection. Your memory is not good enough otherwise and the Herbarium does not want specimens with faulty data.
2. There can be no collections from any population that we identified to species together as a class, such as during a lab.
3. You will not receive credit for records which duplicate the species of another of your records for this project.
4. Collect only wild plants. Don't collect plants that have been planted by somebody and are under cultivation.
5. You must press your plants between folded newsprint that is labeled with your name and collection number in the lower right corner on the outside so your instructor can determine whose they are since s/he will be processing them for drying and then will distribute them back to you once dry. Unlabeled specimens will not be accepted for drying.
6. You may not collect on private property without the permission of the owner.
7. You may not collect in any state or national park or forest, or out of the country, without the proper permits.
8. You may not collect plants within 5 m of a trail.
9. For herbaceous plants, you may not collect the only plant in a population or remove plants from a small population (e.g., 20 plants or less). For larger plants (e.g., shrubs and trees), you may collect a cutting from the only plant in a population that will fit a herbarium sheet, so long as the removal of that cutting is not so large as to negatively affect the chances of that plant's survival or reproductive success.
10. Information on special concern plants that are off-limits for collection will be described in class by your instructor.

C. Each Species is Worth 5 pts as Follows (point values in parentheses indicate potential deficiency deductions):**1. NatureAtlas.org Entry**

- a) Accuracy of pushpin marker placement (1 pt)
- b) Completeness & accuracy of info: all NA fields except "voucher comments" are required (0.25 pt ea)
- c) Entry information must match precisely the information on the herbarium specimen label (0.25 pt ea)
- d) Photograph of the organism: (1 pt)
 - a. must be of that particular plant, not from some stock photo or photo taken at a different time or place,
 - b. must be your own photo,
 - c. must be of sufficient quality for your instructor to discern the species,
 - d. must be right-side-up.

2. Herbarium Specimen (unmounted, unlabeled or not completely dried glue or specimens receive no credit)

Label (follow the format and instructions for making labels in NA users' manual online):

- a) On acid-free paper? Glued well? Positioned correctly? (1 pt ea)
- b) Taxon Block: All fields required; species, genus, and family IDs (0.5 pt ea), species or subspecific author (0.25 pt ea)
- c) Location Block: Country, State, County, Municipality, Watershed, Locale Description, and Coordinates required; Park or Campus name if appropriate (0.25 pt ea)
- d) Organism Block: All fields required; Wild status, Phenology, DBH (incl. 0 cm when not reaching BH), Abundance, Description (e.g., height, color of leaf, stem, flower, or fruit) (0.25 pt ea). Of the plant at that locality: not a description out of a book, etc.
- e) Voucher Block: Collector name (your name), collection number, herbarium name = "MVSC (The James C. Parks Herbarium at Millersville University)" (0.5 pt ea).
- f) Formatted correctly? Did you use the template WORD file to make them? (1 pt)

Specimen:

- a) Stem and leaves present at minimum? (No credit if not)
- b) Roots and all of plant present for plants small enough to fit onto sheet? (2 pt)
- c) Is the specimen fertile? (1.5 pt)
- d) Flower, fruits, or sporangia: Exposed and clearly pressed? Attempt made to display one as dissected for educational value on herbarium sheet? (0.5 pt)
- e) At least one of the leaves and the reproductive parts (e.g., fruit or flower) should be attached to the stem to show how they are attached. (0.25 pt ea)
- f) Leaves: top and bottom surfaces visible; pressed flat, spread apart and uncluttered (0.25 pt)
- g) Does the specimen fit the sheet (it should not hang off of the sheet)? (1 pt)
- h) Was the specimen dried properly in a press (i.e., not wrinkled, etc.)? (2 pt)
- i) Glued well? Thicker parts will take more glue or sewing. (2 pt)

D. Fieldbook Check: Your instructor reserves the right to ask for and check through your field notebook and to deduct up to 5 points if it is not complete.