

Instructor

Dr. Ross A. McCauley
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Office hours: MWR 10:00 am-12:10 pm and by appointment

Course information

Meeting time and place: Lecture/Lab MWR 8:00–10:00 am, Berndt 440; Field T 8:00 am – 4:30 pm. The lab and herbarium will be open and available for independent work until at least noon on all class days.

Required texts:

- Judd, W. S., C. S. Campbell, E. A. Kellogg, P. F. Stevens and M. J. Donoghue. 2008. *Plant Systematics: A Phylogenetic Approach*, 3rd Edition. Sinauer Associates, Inc., Sunderland, MA. ISBN: 978-0-87893-407-2
- Weber, W. A. and R. C. Wittmann. 2012. *Colorado Flora: Western Slope*, 4th edition. University Press of Colorado, Boulder, CO. ISBN: 978-1-60732-142-2
- Harris, J. G. and M. W. Harris. 2001. *Plant Identification Terminology*, 2nd edition, Spring Lake Publishing, Spring Lake, UT. ISBN: 978-0-96402-216-4

Required Supplies (available at FLC bookstore – probably not shelved with textbooks – ask clerk for assistance)

- 10x handlens
- 1 Rite-in-the-Rain, Horizontal Line All-Weather Notebook, No. 391

Course Website: <http://moodle.fortlewis.edu>

I will use Moodle as a repository for any lecture material and plant lists. Most of these will also be made available in class.

Course Description

Field Systematic Botany is designed to teach you the skills necessary to identify plants (principally Angiosperms) in the field. We will primarily focus on two specific aspects of plant identification 1) family recognition and 2) species determination using technical characters. These skills are invaluable for work in various aspects of biodiversity research. Secondarily we will touch on other aspects of botanical systematics including the principles and methodology of nomenclature, phylogenetics, and classification.

Prerequisites: BIO 206 (General Botany), BIO 260 (Genetics)

Specific Objectives (in no particular order)

1. Be able to use the proper terminology for vegetative and reproductive features used in the identification of vascular plants.
2. Become proficient at using technical keys for the identification of flowering plants.
3. Learn to recognize approximately 50 different plant families of SW Colorado.
4. Learn to use proper scientific names.
5. Be able to prepare high quality voucher specimens for ecological and biodiversity research.
6. Gain an understanding of the relationships between evolutionary history and plant classifications.
7. Demonstrate basic knowledge and skill in using biodiversity data.
8. Demonstrate proper use of herbarium-derived data.
9. Understand the importance of precise systematic data for use in management, conservation and research activities.

Course Evaluation

Quizzes (both family id and keying) (10 pts. each)	70 pts.
Nomenclature HW	20 pts
Herbarium database HW	20 pts
Plant Collection	100 pts
Final exam	100 pts
Total:	310 pts

Your grade will be a sum of the earned points you have accrued throughout the term. Due to the short time frame of this course I will NOT accept any late work, there will be NO make-up quizzes or exams, and there will be NO extra credit.

Course Organization

Lecture/Lab:

This class will have a minimal level of traditional lecture although some material will be presented in this form. Much of our time will be spent in “lab” working with plants collected in the field. Plant systematics and plant identification in particular take lots of practice to learn the patterns corresponding to individual families or genera. Thus most of our time will be used toward your learning these suites of characters.

Field trips:

We will have one day-long field trip every Tuesday. Field trips should be expected to take the whole day and we may visit multiple sites during one trip. Your personal gear should include sturdy, closed-in shoes, long pants, sun protection, food and plenty of water for the entire day. If you are particularly sensitive to insects insect repellent may be useful. If you have anaphylactic reactions to insect stings please let me know and provide your own appropriate medicine (ie. epipen) and inform myself on how to administer.

You should bring your field book, your Colorado Flora, handlens, and your Plant Identification Terminology book with you on field trips. You will need to take notes in the field as I will spend time discussing plant identification traits, plant natural history, etc. Some of the material I discuss in the field will be required and not repeated in a lecture setting. We will also collect specimens as a group which will serve as our reference study collection. Some will be dried while others will be stored in refrigeration. Both will be available for your use and study.

Each trip will result in a list of observed and required families. The day following the field trip I will provide a list of all required families and/or genera.

I will expect all students to be prompt and we will leave at 8AM. I will not wait for late students and you will not be able to make up material missed by your absence.

Information on selected assignments etc.

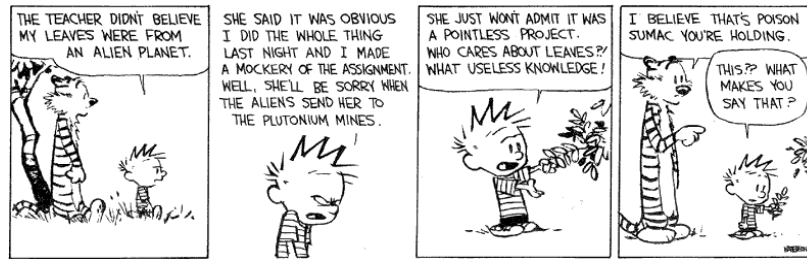
Quizzes: We will have an average of two quizzes each week. There will be a field quiz during each field trip which will require you to identify specimens to family or use your key to identify plants to species. We will also have some quizzes in the lab. These will only focus on your determination of species using your identification key. While I hope that you will all determine the correct family or species I will award partial credit for the correct family and/or genus determinations. To earn either full or partial credit on a keying quiz you must write out the number of each couplet you take starting with the Key to Families and ending with the specific epithet. If you're not sure what this means now you will very soon.

Final exam: We will have one exam at the end of the term which will be partially based on lecture material, sight identification of selected plant families, and the keying of an unknown specimen.

Nomenclature Homework: This assignment will review pertinent concepts in plant naming following the International Code of Botanical Nomenclature (ICBN) including Latin name formation, author citation, synonymy, priority of publication, typification, diagnosis, etc.

Herbarium Database Homework: The availability of biodiversity information in electronic format is changing the way that scientists and resource managers use systematic data. This assignment will show you the types of information available and have you practice with specific applications of this data.

Herbarium Plant Collection:



The plant collection must include 25 identified and properly labeled specimens representing different species (or infraspecific taxa). These 25 specimens must come from a minimum of 10 different families. All specimens must be labeled with complete collection information (collector's name, collection number, family, genus, species, author citation, collection date, locality, and any additional information regarding ecology or plant form) and corresponding to the format used in the FLC Herbarium (There is a Word template available on Moodle to assist you with making your labels).

Things to keep in mind

- Your plants must be wild-collected and can come from any geographical location or environment.
- You cannot collect cultivated garden plants - they must be a part of the native flora!
- In making the collection you must remain aware of where you can legally collect and ask permission if necessary.
- Do not collect cacti or any rare or endangered species. If not sure ask me or don't collect.
- You may use a Plant Collection Worksheet (available on Moodle) for each specimen to assist you in gathering the required information for completing your final specimen label.
- You will be able to sign out a plant press, hand clippers, spade and GPS unit either individually or as a small group to assist with your collecting (and these must be returned or I will not release your final grade for the course!).
- Drying of plants can be performed in the dryer in the herbarium.
- All specimens must include fertile material unless our key does not require it to make an accurate determination.
- Plants must be turned in pressed and dried with each plant in separate folded newspaper. Each specimen must be accompanied by a properly formatted label. This should all be turned in in a large manila folder (available in the herbarium)
- I encourage you to find interesting places to collect – Interesting places = interesting plants.
- And lastly I hope that you will see this assignment as FUN and not work.

The collection will be graded in the following manner:

Identification: Specimens will require proper identification. If an identification key other than our Colorado Flora is used for taxon identification, be sure to let me know via a note. (If you collect in Utah or New Mexico I do have the Utah and New Mexico Floras available in the Herbarium Library for your use)

Specimen quality: Full credit will not be awarded to poor specimens.

Label data: Your labels must be complete – follow the Plant Collection Worksheet and sample label on the template for guidance. Metric units should be used for elevation and for describing any size data. The only English unit I will accept will be miles (ex. “5 miles West on Forest Rd. 200”) You may use either Latitude/Longitude or UTM for giving coordinates. Be sure to include the datum used.

Specific taxa: I will not accept as part of your collection any Gymnosperms unless your collection represents a new county record. You may collect Pteridophytes (=Monilophytes) but you will be limited

to a maximum of two specimens. Your total collection will be required to have at least two specimens from the family Asteraceae and two monocot specimens.

Due Dates: Your collection will be due in two parts. 10 specimens will be due at the end of week 3. The remaining 15 plants will be due the day before the final exam.

Expected prerequisite and background knowledge

Field Systematic Botany is an extension of some of the material you learned in General Botany. Due to the short time frame of the course I will not take time to review specific concepts covered in General Botany. Be sure that you remember and understand the following concepts. Review your General Botany lecture and lab materials if you are not sure.

- Plant life cycles – particularly the heterosporous life cycle as exhibited by higher vascular plants.
- Flower structure – sepals, petals, stamens, carpels, zygomorphic, actinomorphic, hypogynous, epigynous. Be sure you know the difference between simple and compound ovaries and how to determine carpel number. Know the difference between ray (ligulate) and disc flowers in the heads of Asteraceae. Be able to differentiate dicots and monocots on basic floral structure.
- Vegetative features – be sure you understand phylotaxy, simple vs. compound leaves, stipules, basic venation patterns and leaf structure.

Other Course policies (the required stuff)

Academic Integrity:

The Biology Department upholds College policy on Academic Integrity. Therefore, students who commit acts of academic dishonesty (a.k.a. cheating, copying, plagiarizing):

1) on homework or other less major assignments, will receive a ZERO on the assignment in question, and will be reported to Academic Affairs.

2) on exams, major papers or reports will earn a ZERO and be automatically removed from the COURSE, and will be reported to Academic Affairs.

Any student who accumulates two reported incidents of dishonesty with the Academic Affairs office will have a formal hearing with the Academic Standards Committee and faces academic dismissal from the College.

Attendance:

I expect all students to attend all class sessions. If this will be a problem I would suggest dropping the course at this time.

Classroom conduct:

While I hope it goes without saying, please respect the rights of myself and your fellow classmates. Additionally please leave mobile phones, pagers, iPods, etc. at home or turn them off and keep them stowed during class. I will not allow texting or checking of messages on any electronic device during class time. If this becomes a problem you will be asked to forfeit your device. Such activity is not only very disrespectful but also interferes with your ability to learn.

There will be NO usage of alcohol or illegal drugs at any time during the course according to FLC policy. There will also be NO use of any tobacco products both when on and off campus.

Accommodations:

Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements must register with the Disability Services Office. If you qualify for services through the Disability office, bring your letter of accommodations to me as soon as possible so I can make the appropriate arrangements. Letters are available through Dian Jenkins, Coordinator of Disability Services, 280 Noble Hall, 247-7459.

Tentative Schedule

Readings: W&W: Weber, W. A. and R. C. Wittmann. 2012. Colorado Flora.
 Harrington: Harrington, H. D. 1977. How to identify grasses and grasslike plants.
 Judd: Judd, W. S., et al. 2008. Plant Systematics: A Phylogenetic Approach.
 Murrell: Murrell, Z. E. 2010. Vascular Plant Taxonomy.

Wk	Date	Topics	Reading/ Assignment
1	June 3-6		
	Mon.	Introduction – What is it and the importance of biological systematics. Plant classification activity.	W&W Intro. Judd Chap. 1
	Tues.	Field – Junction Creek Scavenger hunt; Introduction to keying; Collection/pressing techniques	Judd App. 2
	Wed.	Review of observed families Keying practice	
	Thurs.	Nomenclature New species description	Judd App. 1 Nomenclature HW – Due. Monday Jun. 10.
2	June 10-13		
	Mon.	Herbaria; Biodiversity Databases	Herbarium Database HW – Due Monday Jun. 17
	Tues.	Field – Location TBA Quiz – Family identification	
	Wed.	Review of observed families Keying practice Focus on Asteraceae	Murrell Asteraceae (Compositae) handout
	Thurs.	Keying quiz Basic phylogenetic principles Phylogenetic Classification of Angiosperms	Judd Chap. 2 (skim only) Chap. 7 (p. 173 forward) and Chap. 9
3	June 17-20		
	Mon.	Phylogeny and classification	
	Tues.	Field – Location TBA Quiz – Family identification	
	Wed.	Review of observed families; Introduction to grass morphology	Harrington Chap. 1-4
	Thurs.	Keying quiz Keying practice with grasses	Judd Chap. 9 Plant Collection Pt. 1 Due

4	June 24-27		
	Mon.	No Class (Dr. M. at Annual Conference of the Society for the Study of Evolution in Snowbird, UT)	
	Tues.	Field – Location TBA Quiz – Family identification	
	Wed.	Review of observed families; Introduction to non-grass graminoid morphology	Harrington Chap. 6 &7
	Thurs.	Keying quiz Keying practice (mostly <i>Carex</i>)	
5	July 1-4		
	Mon.	Plant conservation; Intro. to CO Natural Heritage Program data standards and procedures	
	Tues.	Field – Roaring Fork and Wildcat Canyons - NE of Dolores (CONHP rare plant data collection) Quiz – Family identification	
	Wed.	Wrap-up and review	Final Plant Collections Due
	Thurs.	Final Exam	