

Plant Systematics
Biology 5435

The goals of this course are to 1) acquaint you with the major groups of land plants, with an emphasis on angiosperms (flowering plants), 2) develop an understanding of the methods of formulating and evaluating evolutionary hypotheses with respect to higher plant relationships, and 3) gain proficiency in identifying local flora using standard taxonomic references and techniques.

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Office hours: The best time to see me is after lecture, during lab, or by appointment.
I will set up regular office hours at other times if it becomes necessary.

Class hours: Lecture: Monday, Wednesday, Friday 10:45-11:35 AM, JTB 230
Lab: 12:55-5:00, JTB 230

REQUIRED ITEMS

Please come to lab equipped with a **field notebook** (bound or unbound, with plain white paper), a pencil, and an eraser. A hardbound notebook or clipboard will be useful in the field. The lab notebook will not be graded, but will help you to study for exams and quizzes. A pocket-sized loose-leaf type is recommended.

It is essential that you buy a **10X hand lens**. These are available at the bookstore (ca. \$6). You will need this to examine the often minute features of plants that are used to identify species.

A few sources of higher quality lenses are listed below:

BioQuip

www.bioquip.com

Phone: (310) 667-8800

Fax: (310) 667-8808

Recommended items:	10X Coddington Magnifier	1128B	\$29.75
	10X Hastings triplet magnifier	1128E	\$47.55

Amateur Geologist

www.amateurgeologist.com

Phone: (760) 876-5427

Fax: (760) 876-5429

Recommended items: 10X Coddington Magnifier \$29.70
 10X Hastings triplet magnifier \$47.57

Wards Biology Supply

www.wardsci.com

Phone: (800) 962-2660

Fax: (800) 635-8439

Recommended item (Bausch & Lomb lenses):

 10X Coddington Magnifier 251620 \$43.94

TEXTBOOKS

Judd, W. S., C. S. Campbell, E. A. Kellogg, P. F. Stevens, and M. J. Donoghue. 2008. *Plant Systematics: a phylogenetic approach*. Third edition. Sinauer Inc., Sunderland, MA.

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins. 2003. *A Utah Flora*. Third edition. Brigham Young University, Provo, UT.

Arnow, L., B. Albee, and A. Wyckoff. 1980. *Flora of the Central Wasatch Front, Utah*. University of Utah, SLC, UT.

Copies of Arnow et al. are available for \$50.00 for purchase from the University of Utah Biology Department (cash or checks payable to "U of U Biology Dept.") For those who do not want to purchase the book, copies are available for rent at \$20 plus a \$30 deposit refundable on return of the book in satisfactory condition at the end of the course.

Readings on the course schedule refer to Judd et al.

Copies of the textbooks along with other pertinent references will be available in the lab and (if possible) on reserve at Marriott Library. Please do not remove books from the lab.

HANDOUTS

Handouts will be given during lecture and lab. The T.A. will have a set of extra handouts if you lose yours. The syllabus, handouts, homework, and other course-related items will be posted on the Canvas site assigned to this course and can be downloaded from there. Lecture notes will not be posted, so make sure you attend class.

OTHER USEFUL RESOURCES

In addition to reserve copies of your textbook, several other botanical resources may be helpful in identifying plants from the Great Basin region. Some of these will be available in the lab room; others can be consulted in the Bohs lab (232 South Biology).

The Arnow et al. book only covers plants from Salt Lake and Davis Counties, and the Utah Flora only covers plants from Utah. If you want to identify plants from other areas in Utah or outside the state we have the Utah Flora and the Northwestern Flora on CD on a PC computer in the classroom. These CDs have a search function to help you with identification as well as numerous photographs.

Harris, J. G, and M. W. 1997. *Plant Identification Terminology; an Illustrated Glossary*. Spring Lake Publications.

If you are floundering in an ocean of terminology, this book will help.

Hegji, Steve. 2010. *Wasatch wildflowers; a field guide*. CFI, Springville, UT.

Shaw, R.J. 1995. *Utah Wildflowers, a Field Guide to Northern and Central Mountains and Valleys*. USU Press, Logan, UT.

Pluses for both of these field guides: photographs of local wildflowers make an approximate identification easier. Minuses: only a portion of plants is covered and it cannot be used for precise identification. Sometimes at the U bookstore.

Whitson, T. D. et al. 1993. *Weeds of the West*. University of Wyoming Press.

Excellent reference for weedy species, ca. \$22.

Taylor, R. J. 1992. *Sagebrush Country*. Mountain Press Publishing Company.

Non-technical guide with photographs. Covers the west desert country flowers as well as some mountain flowers.

Trimble, S. 1989. *The Sagebrush Ocean*. University of Nevada Press, Reno, NV.

A great introduction to the natural history of the Great Basin with beautiful photographs.

Cronquist, A., A. H. Holmgren, N. H. Holmgren, P. K. Holmgren and others.
Intermountain Flora. New York Botanical Garden, Bronx, NY. Multi-volume set.

An incredibly useful, authoritative, and comprehensive guide to the plants of the Intermountain West, including Utah and parts of surrounding states. Each species is accompanied by a line drawing.

Flora of North America Editorial Committee and others. *Flora of North America*.
Oxford University Press, NY. Multi-volume set.

Ditto for this multi-volume treatment, but it covers North America north of Mexico and usually has a single species illustrated per genus. A dozen or so volumes have been published thus far, with many others in the pipeline.

These are both fantastic resources, but pricey (several hundred dollars for the sets). If you would like to consult them, we have a set of these books in the Bohs lab (232 South Biology) and there is another set in the herbarium. Please leave the Bohs lab books in the lab room; they are expensive and we use them frequently in our research.

WASATCH FLORA CD

Dr. Bill Gray, formerly of the University of Utah Biology Department and current president of the Utah Native Plant Society, has developed a CD version of the Arnow et al. Wasatch Flora book. His version includes a search function that allows you to identify plants without keying them out. It also includes numerous photographs. We will demonstrate this CD during the first lab period. A limited number of CDs will be available for purchase for \$20 (cash or checks made out to "Cyberflora"). A copy of the CD will also be installed on the computers in the lab room for your use in identifying plants.

LAB ROOM RESOURCES

We encourage you to use the lab room on your own time for identifying homework plants and the plants in your independent collection. For this purpose you will have ID card access to the lab room Monday through Friday. Extra copies of your textbooks will be available here as well as several CD programs installed on the computers to help with plant identification.

There will be some dissecting scopes available in the classroom for use in keying out plants. You will find these extremely useful for plant identification.

LABORATORY

Many of the laboratory sessions will be devoted to field trips. Other lab sessions will consist of a directed overview of the plant groups covered in the lecture. You can also work on identifying your plant collections during lab time. Attendance at lab is required.

Most labs will have a quiz reviewing material from the lab. Periodically we will assign homework plants. These will consist of unknown plants that you attempt to key out with your textbooks. You will do this on your own time.

Each lab quiz or homework will be worth 10 points, with a total of 100 lab quiz points for the semester. If we have more than a total of 100 possible lab quiz points, you may drop your lowest scores and count only the 10 best quiz grades.

FIELD TRIPS

Several field trips have been scheduled during laboratory time on Thursday afternoon. Attendance is required. Departure will be from the parking lot between the University Bookstore and the Skaggs Biology Building. Please be on time. All trips will take at least until 5 pm. Sometimes we may be a little late in returning. Transport will be provided in university vans. Field trips may be cancelled or re-routed due to weather conditions.

Come prepared with the following:

- Field boots or shoes (good ankle support is important, and there are rattlesnakes out there)
- Hand lens
- Utah flora (for keying practice)
- Hat
- Sunscreen and lip protectant
- Field book and pencil(s)
- Pocket knife if you have one
- Plastic bag(s) for collecting (optional)
- Rain gear (if it's threatening)
- Insect repellent (essential for west desert field trip)
- A quart of water
- Daypack

Please be aware that these field trips come with the usual risks of travel and outdoor activities. These include sunburn, snake and insect bites, including bee and wasp stings, poison ivy (although rarely encountered), twisted ankles, dehydration, etc. We will be as prepared as possible against these risks, but can offer no guarantee that they will not happen.

The University requires that each student sign a waiver form indicating that you understand these risks.

One weekend field trip to southern Utah is planned during the course. This field trip is required. Details will be given in lecture.

INDEPENDENT PLANT COLLECTION

For your independent project you will take your own "field trip" to one or more novel localities (that is, ones that we have not visited in class). Here you will collect and identify 25 plants that are in flower and/or fruit and make botanically accurate labels to accompany your specimens that note the collecting locality, date, collector, and additional attributes of the plant. More details will be forthcoming on this exercise.

TESTS, QUIZZES, AND HOMEWORK

Each field trip will include a quiz. Most of these will ask you to identify plants we have learned. Some may require you to key out “unknowns” with the help of your texts. We will also periodically hand out homework that should be done individually and out of class.

We will also devote part of one lecture each week to quizzes to review your knowledge of plant families.

Exams will cover lecture and lab material. Part of each exam will be a “practicum” asking you to identify various plants or answer questions about them.

GRADING

The final grade will be based on two hour exams (15% each), a final exam (15%), a plant collection (35%), a plant family assignment (10%), and lecture and lab quizzes (10%).

GARRETT HERBARIUM

An “herbarium” is a library of pressed and identified plants. The Garrett Herbarium is located in the University of Utah Natural History Museum. You will take an orientation tour of this herbarium and can use it at any time during the course. You will find it especially useful if you can’t identify a plant, or if you want to confirm your identification. It is also useful if you are searching for a particular species and want to see what it looks like first. Mitch Power is the Director of the Herbarium and Elizabeth Johnson is the Collections Manager. You should call before you plan on coming (phone number: 801-587-5745).

INDEPENDENT COLLECTION OPTION

Because our course largely takes place during winter weather, Plant Systematics students may sign up for an individual research project (Biology 4955) for the following spring and/or summer terms. This will involve making a plant collection identified to species with collection labels. You will receive 1 credit for 50 plants and 2 credits for 100 plants. For details and sign-up sheets, see the instructor.

STUDENTS WITH DISABILITIES

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

Course Schedule
Biology 5435 - Plant Systematics
Fall, 2014

- Aug. 25 (M) Lecture: Introduction. Nomenclature.
Reading: Appendix 1
- Aug. 27 (W) Lecture: Vegetative morphology.
Reading: Chapter 4
Lab: Plant collecting demo. Wasatch Flora CD demo. Field trip to
Garrett Herbarium, UMNH.
Reading: Appendix 2
- Aug. 29 (F) Lecture: Vegetative morphology.
- Sept. 1 (M) No class. Labor Day holiday.
- Sept. 3 (W) Lecture: Floral morphology.
Reading: Chapter 4
Lab: Field trip to Wasatch Front
- Sept. 5 (F) Lecture: Floral morphology.
- Sept. 8 (M) Lecture: Floral morphology.
- Sept. 10 (W) Lecture: Intro to Rio Mesa field trip.
Lab: Field trip to Wasatch Front
- Sept. 12 (F) Lecture: Collecting guidelines.
- Sept. 12-14
(Fri.-Sun.) Weekend field trip to Rio Mesa Field Station,
southern Utah
- Sept. 15 (M) Lecture: Phylogenetic systematics and evolutionary trees.
Reading: Chapters 1, 2, 5
- Sept. 17 (W) Lecture: Asterid clade/Campanulids.
Reading: Relevant parts of Chapter 9
Lab: Field trip to Wasatch Front
- Sept. 19 (F) Lecture: Phylogenetic systematics and evolutionary trees.
- Sept. 22 (M) Lecture: Asterid clade/Campanulids.
Reading: Relevant parts of Chapter 9
- Sept. 24 (W) Lecture: Phylogenetic systematics and evolutionary trees.

	Lab: Field trip to Wasatch Front
Sept. 26 (F)	Lecture: Asterid clade/Lamiids. Reading: Relevant parts of Chapter 9
Sept. 29 (M)	Lecture: Asterid clade/Lamiids. Reading: Relevant parts of Chapter 9
Oct. 1 (W)	Lecture: Finish Asterid clade and molecular systematics. Lab: Field trip to Wasatch Front or Uintas
Oct. 3 (F)	Lecture: Finish Asterid clade and molecular systematics.
Oct. 6 (M)	Lecture: Amaranthaceae, including Chenopodiaceae. Reading: Relevant parts of Chapter 9
Oct. 8 (W)	Lecture: Speciation & hybridization, polyploidy. Reading: Chapter 6 Lab: Field trip to Timpie Springs, West Desert
Oct. 10 (F)	Lecture: EXAM 1
Oct. 13-17	No class. Fall Break.
Oct. 20 (M)	Lecture: Caryophyllales Reading: Relevant parts of Chapter 9
Oct. 22 (W)	Lecture: Other Core Eudicots Reading: Relevant parts of Chapter 9 Lab: Field trip to Wasatch Front
Oct. 24 (F)	Lecture: Ranunculales/Proteales. Reading: Relevant parts of Chapter 9
Oct. 27 (M)	Lecture: Malvids Reading: Relevant parts of Chapter 9
Oct. 29 (W)	Lecture: Malvids Reading: Relevant parts of Chapter 9 Lab: Field trip to Wasatch Front
Oct. 31 (F)	Lecture: Malvids Reading: Relevant parts of Chapter 9
Nov. 3 (M)	Lecture: Fabids Reading: Relevant parts of Chapter 9

Nov. 5 (W)	Lecture: Fabids Reading: Relevant parts of Chapter 9 Lab: Field trip to Wasatch Front
Nov. 7 (F)	Lecture: Fabids Reading: Relevant parts of Chapter 9 **PLANT COLLECTIONS DUE TODAY**
Nov. 10 (M)	Lecture: Fabids Reading: Relevant parts of Chapter 9
Nov. 12 (W)	Lecture: Fabids Reading: Relevant parts of Chapter 9 Lab: Field trip to Wasatch Front
Nov. 14 (F)	Lecture: EXAM 2
Nov. 17 (M)	Lecture: Fabids Reading: Relevant parts of Chapter 9
Nov. 19 (W)	Lecture: Fabids Reading: Relevant parts of Chapter 9 Lab: Field trip, greenhouse tour, and/or lab exercises.
Nov. 21 (F)	Lecture: Poales Reading: Relevant parts of Chapter 9
Nov. 24 (M)	Lecture: Poales Reading: Relevant parts of Chapter 9
Nov. 26 (W)	Lecture: Liliales Reading: Relevant parts of Chapter 9 No lab/field trip.
Nov. 27-28	No class. Thanksgiving break.
Dec. 1 (M)	Lecture: Magnoliids Reading: Relevant parts of Chapter 9
Dec. 3 (W)	Lecture: Magnoliids Reading: Relevant parts of Chapter 9 Lab: Field trip (winter twigs and buds) or lab exercises.
Dec. 5 (F)	Lecture: Misc. families Reading: Relevant parts of Chapter 9

FAMILY REPORTS DUE TODAY

- Dec. 8 (M) Lecture: Misc. families
Reading: Relevant parts of Chapter 9
- Dec. 10 (W) Lecture: Misc. families
Reading: Relevant parts of Chapter 9
Lab: Field trip to Smith's Marketplace.
- Dec. 12 (F) Lecture: Misc. families
Reading: Relevant parts of Chapter 9
- Dec. 15 (M) Final exam
10:30 AM – 12:30 PM in the classroom