

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 us is after lecture, during lab, or by appointment. Contact us and we will set up an appointment to meet in person or by phone or Zoom.

Class hours: Lecture: Monday, Wednesday, Friday 10:45-11:35 AM, JTB 230
Lab: Wednesday 12:55-5:00, JTB 230
Lectures and labs will be in-person.

COVID PRECAUTIONS AND PHILOSOPHY

There are still many challenges and unknowns because of the COVID pandemic. We will do our best to offer you a quality learning experience but plans and teaching methods may need to be altered during the semester. It is hoped that we can act as a team and exercise patience, honesty, and flexibility. Your learning experience is important to us and we will keep lines of communication open to make our fall semester run as smoothly and safely as possible.

Please do not come to class or lab if you are sick or test positive for COVID. If you have been exposed to COVID, please follow the guidelines on the University website at <https://coronavirus.utah.edu/> If you cannot come to class, please contact the instructors as soon as possible to make a plan for making up missed material.

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.

TEXTBOOKS

Judd, W. S., C. S. Campbell, E. A. Kellogg, P. F. Stevens, and M. J. Donoghue. 2016. *Plant Systematics: a phylogenetic approach*. Fourth edition. Sinauer Inc., Sunderland, MA.

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins. 2003. *A Utah Flora*. Fourth 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.

The Arnow book (“The Green Book”) is an essential reference but is out of print. Copies of Arnow et al. are available for \$50.00 for purchase in class from the University of Utah Biology Department. 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. 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, PowerPoints and other course-related items will be posted on the Canvas site assigned to this course and can be downloaded from there.

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 in the classroom.

Harris, J. G., and M. W. 2001. *Plant Identification Terminology; an Illustrated Glossary*. Second edition. Spring Lake Publications, Spring Lake, UT.

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 APP

The Flora of the Wasatch application for iPhone, iPad, and Android by Steve Hegji and Whitney Tilt may be useful for you in the field. It contains photographs, descriptions, and a synoptic key (to search by characteristics) for over 300 species found in the Wasatch area. Please note that this does not include all the species found in the area; for that, you will need the Arnow et al. book (“green book”) or the Utah Flora. But this app will help to get you started with the most common or showy species. It is downloadable for \$7.99 from High Country Apps through iTunes.

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 also be available here. 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 Wednesday 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.

When in the field, come prepared with the following:

- Field boots or shoes (good ankle support is important, and there are rattlesnakes out there)
- Hand lens
- Arnow “green book” (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 liter of water
- Daypack
- MASKS ARE REQUIRED ON ALL FIELD TRIPS.

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. Details will be given in lecture.

INDEPENDENT PLANT COLLECTIONS

For your independent collecting projects, you will take your own "field trips" to one or more novel localities (that is, ones that we have not visited in class). Here you will collect and identify 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 may also have lecture 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%), two plant collections (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 Allison Isaksonas is the Collections Manager. You should call before you plan on coming (phone number: 801-587-5745).

EXPECTED LEARNING OUTCOMES

Core Concepts for Biology

- 1) Evolution - Students will be able to apply the principles of natural selection and mechanisms of genetic change to explain the observed diversity of life that has arisen over long-term as well as recent evolutionary time frames.
- 2) Structure and function - Students will be able to apply knowledge organismal structures to explain the diverse set of functions that underlie the remarkable diversity of individual organisms as well as communities of organisms.

Core Competencies for Biology

- 1) Ability to apply the process of science – Students will be able to apply the process of science to identify knowledge gaps, formulate hypotheses, and test them against experimental and observational data to advance an understanding of the natural world.
- 2) Ability to explain the relationship between science and society and engage – Students will be able to evaluate the interactions between biology and society and clearly communicate biological concepts and their implications to broad audiences.

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.

THE AMERICANS WITH DISABILITIES ACT

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 this class,

reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

UNIVERSITY SAFETY STATEMENT

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

ADDRESSING SEXUAL MISCONDUCT

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).