

# IB 335, Plant Systematics (Spring 2023)

**Plant Systematics** introduces the principles and methods of identifying, naming, and classifying flowering plants; provides an introduction to the natural history of flowering plants (e.g., pollination biology, dispersal mechanisms, breeding systems) and the use of phylogeny estimation in producing modern classifications; develops skills in using plant identification keys; and includes a survey of 40 of the most important plant families distributed worldwide. The course meets three times a week for lecture and once a week for a two-hour lab. Credit: 4 hours.

This is a basic natural history of plants course. If you want to learn more about the flowering plants around you – the structure and purpose of flowers and fruits, how plants are identified and named, and salient features of the important plant families distributed worldwide – this is the course for you! We spend a lot of time looking closely at flowers. If you enjoy the outdoors and nature, want to develop skills in using identification keys for personal interest or future job opportunities, want to know how to use botanical scientific names correctly, or are interested to know how scientists create and use phylogenies to inform classifications, take this course! As all past students will attest, this course will definitely change the way you look at plants!

**Prerequisites:** No prerequisite is required.

## Lecture and Lab Schedule

Lecture (AL1)	MWF	9:00 – 9:50 AM	NHB 2083
Lab (AB2)	M	1:00 – 2:50 PM	NHB 4072
Lab (AB3)	M	3:00 – 4:50 PM	NHB 4072

## Instructor

Dr. Daniel S. Bush  
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**Office hours by appointment**



## Major Student Learning Outcomes

By the end of the course, you should be able to:

- 1) Possess a significant knowledge base in the principles and methods of plant systematics
- 2) Recognize 40 of the most important flowering plant families and subfamilies globally
- 3) Understand that modern plant classifications are informed by evolutionary relationships
- 4) Know how to use plant scientific names correctly, including the names of infraspecific taxa, interspecific hybrids, and cultivated varieties
- 5) Apply newfound knowledge of floral, fruit and vegetative features to effectively use dichotomous keys to identify unknown plants to family, genus, and species
- 6) Use critical thinking skills to solve systematic problems involving matrix building, cladogram construction and interpretation, nomenclature, and classification revision
- 7) Work collaboratively to carry out the process of scientific inquiry

## Moodle

Moodle is our course management system, and its access is limited to students and staff associated with IB 335. To learn more about Learn@Illinois Moodle Service or to contact a Teaching & Learning with Technology (ATLAS-TLT) consultant, send an email to [atlas-tlt@illinois.edu](mailto:atlas-tlt@illinois.edu).

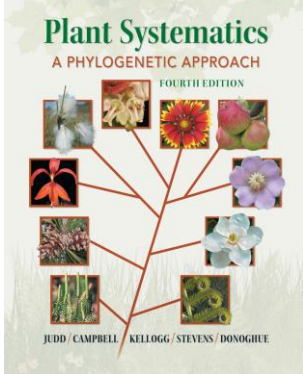
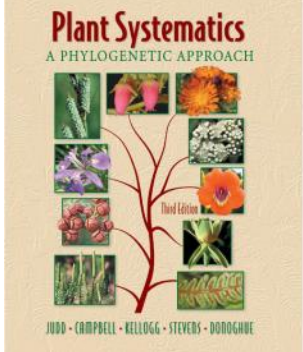
## Class Notes

The coursepak "*Systematics of Plants, Family Notes & Laboratory Exercises*" for IB 335 can be purchased at the Illini Union Bookstore. This coursepak is **REQUIRED**. Bring this coursepak with you to terminology and family lectures and all labs.

## Computer and Lab Supplies

You will need a computer for most collaborative learning activities held during lecture, for doing the online assessment quizzes and lab examinations, and for carrying out all keying exercises. Drawing pencils, drawing paper, an eraser, and a small ruler are required for the laboratory. You are welcome to bring your own set of simple dissecting tools, which would help tremendously and are probably of better quality than ours. Feel free to take pictures of your dissections and demonstration materials!

## Textbook(s) RECOMMENDED

	<p>Walter S. Judd, Christopher S. Campbell, Elizabeth A. Kellogg, Peter F. Stevens, and Michael J. Donoghue. 2016.</p> <p><i>Plant Systematics. A Phylogenetic Approach. <b>Fourth Edition.</b></i></p> <p>Sinauer Associates, Inc. Sunderland, Massachusetts, USA.</p> <p><b>RECOMMENDED</b></p>
	<p>Walter S. Judd, Christopher S. Campbell, Elizabeth A. Kellogg, Peter F. Stevens, and Michael J. Donoghue. 2008.</p> <p><i>Plant Systematics. A Phylogenetic Approach. <b>Third Edition.</b></i></p> <p>Sinauer Associates, Inc. Sunderland, Massachusetts, USA.</p> <p><b>This edition will be supported (i.e., page numbers will be provided). There should be lots of used copies available</b></p>

## Lecture Calendar, Exams and Assignment Due Dates

**THIS SYLLABUS IS SUBJECT TO CHANGE!  
SEE COURSE MOODLE FOR UPDATES!**

Lecture Number	Date	Lecture Topic
1	Wed, Jan 18 <b>Lecture Assignment 1 Assigned</b>	Course Information and What is Systematics?
2	Fri, Jan 20	Vegetative Terminology
3	Mon, Jan 23	Vegetative Terminology continued
4	Wed, Jan 25	Taxonomic Hierarchy and Classification
5	Fri, Jan 27 <b>Lecture Assignment 1 Due 11:55 PM</b>	Floral Terminology
6	Mon, Jan 30	Floral Terminology continued and Floral Formulas
7	Wed, Feb 1	Botanical Nomenclature
8	Fri, Feb 3 <b>Lecture Assignment 2 Assigned</b>	Botanical Nomenclature continued
9	Mon, Feb 6	Fruits and Inflorescences
10	Wed, Feb 8	Methods and Principles of Systematics
11	Fri, Feb 10 <b>Lecture Assignment 2 Due 11:55 PM</b>	Magnoliid Clade and Magnoliaceae
12	Mon, Feb 13	Ranunculaceae & Papaveraceae
13	Wed, Feb 15	Molecular Systematics
14	Fri, Feb 17	Hamamelidaceae & Moraceae
15	Mon, Feb 20	Fagaceae & Betulaceae

16	Wed, Feb 22	<b>Lecture Exam 1</b> Coverage: Lectures 1 – 15
17	Fri, Feb 24	Caryophyllid Clade and Cactaceae
18	Mon, Feb 27 <b>Lecture Assignment 3 Assigned</b>	Caryophyllaceae Portulacaceae Polygonaceae
19	Wed, Mar 1	Breeding Systems
20	Fri, Mar 3	Keying Activities or In-Class Assignment Activities
21	Mon, Mar 6	Family & Terminology Review or Activities to Prepare for Laboratory Exam
22	Wed, Mar 8 <b>Lecture Assignment 3 Due</b> <b>11:55 PM</b>	No lecture!
23	Fri, Mar 10 <b>Laboratory Exam 1</b> <b>Coverage: Labs 1 – 7</b>	Ericaceae, Salicaceae & Violaceae
	Week of Mon, Mar 13	Spring Break!
24	Mon, Mar 20	Malvaceae, Cucurbitaceae & Brassicaceae
25	Wed, Mar 22	Pollination
26	Fri, Mar 24	Class Activities: Keying Exercises
27	Mon, Mar 27 <b>Lecture Assignment 4 Assigned</b>	Fabaceae and its 3 subfamilies, Onagraceae & Euphorbiaceae
28	Wed, Mar 29	Tall-Grass Prairies or Activities
29	Fri, Mar 31	Dispersal
30	Mon, Apr 3 <b>Lecture Assignment 4 Due</b> <b>Tues, Apr 6, 11:55 PM</b>	Asclepiadaceae, Solanaceae, Oleaceae & Caprifoliaceae

31	Wed, Apr 5	<b>Lecture Exam 2</b> Coverage: Lectures 16 – 30
32	Fri, Apr 7	Lamiaceae & Scrophulariaceae
33	Mon, Apr 10	Asteraceae
34	Wed, Apr 12	Preserving and Collecting Plants
35	Fri, Apr 14	Aceraceae & Apiaceae and Poison Ivy
36	Mon, Apr 17	Rosaceae and its 4 subfamilies
37	Wed, Apr 29	Historical Systematics
38	Fri, Apr 21 <b>Lecture Assignment 5 Assigned</b>	Monocots
39	Mon, Apr 24	Monocots (continued)
40	Wed, Apr 26	Origin of Angiosperms
41	Fri, Apr 28	Keying Activities
42	Mon, May 1 <b>Lecture Assignment 5 Due 11:55 PM</b>	Family & Terminology Review
43	Wed, May 3 <b>Laboratory Exam 2 Online Coverage: comprehensive</b>	No lecture!
<b>Final Lecture Exam</b> Comprehensive, but with emphasis on last third of course <b>Date: Friday, May 5</b> <b>Time: 7:00-10:00 PM</b>		

## Laboratory Calendar and Lab Exams

1	N/A	Woody Twigs ( <b>Not This Semester</b> )
2	Mon, Jan 23	Vegetative Terminology ( <b>Plant Biology Greenhouse!</b> )
3	Mon, Jan 30	Floral Morphology
4	Mon, Feb 6	Fruit Terminology
5	Mon, Feb 13	Magnoliaceae, Ranunculaceae, Papaveraceae
6	Mon, Feb 20	Hamamelidaceae, Moraceae, Fagaceae, Betulaceae
7	Mon, Feb 27	Cactaceae, Caryophyllaceae, Portulacaceae, Polygonaceae
	Mon, Mar 6	<b>Lab Exam 1 (Online)</b> Covers Labs 1-7 Opens Mon, Mar 6, 11:55 PM Closes Wed, Mar 8, 11:55 PM
	Mon, Mar 13	<b>Spring Break!</b>
8	Mon, Mar 20	Cucurbitaceae, Violaceae, Salicaceae, Brassicaceae, Malvaceae, Ericaceae
9	Mon, Mar 27	Fabaceae, Onagraceae, Euphorbiaceae
10	Mon, Apr 3	Asclepiadaceae, Solanaceae, Oleaceae, Caprifoleaceae
11	Mon, Apr 10	Scrophulariaceae, Lamiaceae, Asteraceae
12	Mon, Apr 17	Rosaceae, Aceraceae, Apiaceae
13	Mon, Apr 24	Monocots ( <b>Plant Biology Greenhouse!</b> )
	Mon, May 1	<b>Lab Exam 2 (Online)</b> Covers Labs 8-13 Opens Mon, May 1, 11:55 PM Closes Wed, May 3, 11:55 PM

### Grading Scheme

Your final grade (of 100 points) will be determined based on the following scheme:

Grading Scheme Component	Percent of Final Grade
Lecture Activities	15
Lecture Assignments	10
Assessment Quizzes	10
Lecture Exam 1	10
Lecture Exam 2	10
Final Lecture Exam (Comprehensive)	15

Laboratory Exam 1	10
Laboratory Exam 2 (Comprehensive)	10
Laboratory	10

Letter grade breakpoints will be 90% (A), 80% (B), 70% (C), 60% (D), and <60% (F). Occasionally, breakpoints will be less than these values, but never higher. The +/- grading system will be used sparingly, if at all.

While it may seem that there are many separate components in your final grade calculation, this is not the case! The course is fully integrative, with material learned in lecture reinforced in lab and vice versa. Lecture activities, lecture assignments and assessment quizzes are all designed to help you learn the material, and you can expect to see many of the very same questions on both lecture and lab exams. The terminology introduced at the start of the course may be bewildering to some, but these same terms are used throughout the course so by its end you're a pro in using basic botanical terminology! Learner objectives are presented for all lectures and if you can address those objectives, you will know all that you need to know to do well in the course!

Lecture Activities: Throughout the semester you will have 1-2 lecture activities per week. The course is built for collaborative, learning experiences, so expect to participate in a variety of classroom interactions with your fellow students! These lecture activities will likely comprise problem solving, keying exercises, family identification and topical worksheets, and short quizzes. **There is no opportunity to make up missed lecture activities! To receive points for these activities, you must be in class when they are assigned, distributed, or posted.** On occasion, activities will be assigned as homework. Depending upon how many activities are assigned, a small number of them will not count towards this grade, so if you miss some activities because of scheduled field trips or other conflicts, don't worry! Such conflicts might include, but are not limited to: illness, Covid-19, religious holiday, inclement weather, arriving to class late, a job or graduate school interview, athletic team practices and competitions, skipping class, a scheduled field trip in another course, Unofficial, competitions of various types, and \_\_\_\_\_ (*fill in the blank with your excuse*). If you miss class **because of any reason whatsoever** and you fail to hand in a homework activity on time, you will still receive a score of zero. Again, the onus is on you to figure out what you missed and complete it on time. If there is a prolonged absence due to injury or illness, and this has been formally documented, I will gladly work with you to see that this grade can be made-up. Please note that last time the course was taught in-person (Spring 2020), we gave 28 lecture activities and took the 20 best scores to calculate this component of your grade.

Lecture Assignments: These five lecture assignments must be turned in either online before midnight or at the beginning of lectures on the dates they are due. Late assignments (but not more than 24 hours late) will receive a 50% penalty. Assignments more than 24 hours late will NOT be accepted and will receive a score of 0 (because answer keys would have been posted by this time). If you miss a class when a lecture assignment is distributed or announced, the onus is on you to complete it before it is due. If you plan on being absent on a due date, submit or post your completed assignment before that time. There will be opportunities to work on specific assignment questions during lecture and lab. Expect to see some of these very same questions on lecture exams!

Assessment Quizzes: These online assessment quizzes will be available prior to both lecture and laboratory exams to help you prepare for them. All assessment quizzes will be administered online using Moodle. In past years, we've offered 8-10 assessment quizzes.

Lecture Exams: Expect two midterms and one comprehensive final. See lecture calendar for dates.

Laboratory Exams: Expect one midterm lab exam and one comprehensive final lab exam. Both will be administered online using the course Moodle system. See lab calendar for dates.

Laboratory: Your TA will discuss the breakdown of this grading scheme with you in more detail. You will be graded on the activities assigned, weekly quizzes, attendance, and participation. You are expected to attend every lab and be there for the full two-hour duration, or until dismissed by the TA.

### **Attendance**

It is assumed that you will attend every lecture and lab, and you are responsible for the material covered in each whether you have an excused absence or not. **Based on past experience, you will miss 5-10 points on exams for every lecture missed.** The lecture activities and assignment questions worked on during class will likely comprise many exam questions. Common courtesy suggests that if you plan to miss a lecture or lab, you notify the instructor(s) beforehand. It is nearly impossible to make up a missed lab, although it may be possible to attend another lab section that same day. If you miss a lab, be sure to contact your TA.

### **Conflicts, Make-Up Exams and Absences**

Make-up lecture and laboratory exams are generally not given except under exceptional circumstances, such as a major injury, serious illness (due to Covid-19 or whatever), or death in the immediate family. Other circumstances may also warrant a make-up exam, such as religious beliefs and observances or formal participation in scheduled activities of officially recognized groups, such as athletic teams. If you have a conflict with any scheduled lecture or laboratory exam this semester, the university requires that you inform your instructor as soon as possible, but no later than one week before the date of the scheduled exam. Additional information on class attendance, notifications, and absence letters is available in the Student Code (<https://studentcode.illinois.edu/article1/part5/1-501/>) and I will abide by these guidelines, so I ask that you become familiar with them.

If you miss or plan to miss a lecture or laboratory exam, please provide me with a written statement as soon as possible explaining the reason for the absence and supply supporting evidence. If a health related, a note for your health care provider, McKinley Health Center, or the Student Assistance Center in the Office of the Dean of Students is required. If the explanation is acceptable and supported, your remaining lecture and/or laboratory exams will be prorated (that is, worth more). Depending upon how much course work must be made-up, a well-researched term paper on some aspect of plant systematics may be substituted. Be aware



that absence letters do not excuse students from class or ensure that make-up work will be permitted.

If you (or anyone you are responsible for) are experiencing any difficulties with the course because of the effects of Covid-19, please let me know. While the rules above will still apply, I will gladly work with you to help you succeed in this course.

"The [Student Assistance Center](#) is a collaborative resource that promotes the holistic growth and development of Illinois students. To that end, we partner with students, faculty, staff, and family members to address disruptions to students' academic and social stability or behaviors that cause distress in our community. We strive to foster a community of care in which all members have a personal responsibility to themselves and others. Students visit us regarding a broad range of issues which may be impacting their academic performance including those related to health/mental health, course attendance issues, questions about where to go on campus to seek different services, options for withdrawing from the university, or because they need help and just aren't sure where to go."

### **Academic Integrity**

"It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions. Please know that it is my responsibility as an instructor to uphold the academic integrity policy of the University, which can be found here:

<https://studentcode.illinois.edu/article1/part4/1-401/>.

Cheating, plagiarism and fabrication will not be tolerated. Most basically, do not copy from others or have others copy from you! On the various lecture activities and assignments that you will do this semester outside of class, and during all lecture and laboratory exams, we expect your responses will be the result of your own effort. Anything to the contrary is a major infraction of academic integrity. The penalties are severe and may include expulsion from the university. At the very least, you will get a failing grade for the course and a written notice in your university file. A listing of possible academic integrity infractions is provided in the student code: <https://studentcode.illinois.edu/article1/part4/1-402/>. The FAIR (Faculty Academic Integrity Reporting) system will be used for all procedures and sanctions involving academic integrity violations.

### **Disability Accommodations**

To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class are asked to see me as soon as possible. If you have disability needs, schedule a confidential appointment with me at the start of the semester. **Please don't wait until exams are upon us to express your needs!** The link to Disability Resources and Educational Services (DRES) is provided [here](#), which includes the link for [Applying for Services](#).