TAXONOMY OF CALIFORNIA PLANTS - Biology 531
SAN DIEGO STATE UNIVERSITY  Spring 2015
Dr. Michael G. Simpson, Instructor
Course Site: <http://www.sci.sdsu.edu/plants/tax>   Blackboard:<http://blackboard.sdsu.edu>
Plants of San Diego County:  <http://www.sci.sdsu.edu/plants/sdpls>
(619-594-4479; msimpson@mail.sdsu.edu)
(Revised 8 Nov 2014)

To climb these coming crests
one word to you, to you and your children:
stay together
learn the flowers

go light

Gary Snyder, Turtle Island (1974)

To be able to call the plants by name
makes them a hundredfold more sweet and intimate.
Naming things is one of the oldest and simplest
of human pastimes.

Henry Van Dyke in Little Rivers (Dale, 1986)

Required Pre-Requisites
Biology 203, 203L, 204, 204L.

Course Description (Catalog)
Fundamentals of plant taxonomy with emphasis on identification of plants native and naturalized to California. Plant collecting techniques. Field trips are required.

Course Overview
This course is designed for the serious student to acquire the basic skills of native plant identification and basic plant community assessment. It is suitable for advanced undergraduates, graduate students in systematics or ecology, and people with positions in private or governmental conservation/environmental organizations.

Student Learning Outcomes
After completing the course, students should be able to:
1. State, define, and give examples of the components of taxonomy: description, identification, nomenclature, and classification.
2. Describe a plant in detail, using descriptive botanical terminology.
3. Identify on-sight approximately 170 (scientific names, correctly spelled) of the common, native and naturalized plants of San Diego County.
4. Identify an unknown taxon using a taxonomic key and specimen comparisons.
5. Identify, on-sight or using a hand-lens or dissecting scope, approximately 20 angiosperm families (scientific names, correctly spelled).
6. State the principles and rules of plant nomenclature, including how to publish a new taxon name, and know how to use and apply botanical names.
7. Collect, document, and process (press, dry, label, mount) a plant from the field. Toward this, each of you will prepare a collection of plants, pressed, dried, labeled, and mounted.
8. Properly use the collections of the herbarium.
9. Use an herbarium and access herbarium databases.

Students are assessed for the above objectives with quizzes, tests, lab practicals, and assignments.

Add/Drop Procedures
Students who do not show up by the second class date will be dropped by the instructor from the class.
Otherwise, the following apply:
Feb 4: Last day to add/drop classes or change grading basis.
Students will be added to the course with priority on the number of units in their major.

Course Assessment
Students will be assessed with quizzes, group research paper presentations, lecture exams, lab practicals, and an original research project.
Format of class

8:00 am - 8:10 am Quiz
8:10 am - 9:15 am Lecture, discussion, group learning
ca. 9:15 am - 9:30 am Break
9:30 am - 11:20 am Lab time - observing, studying plant material; learning concepts/terms
11:20 am - 11:40 am Review of new plant species

Always bring textbook and lab manual materials to class!

Disabled Students

Please see me (in private) if you have special needs, as approved by Disabled Student Services at SDSU. I will do everything I can to accommodate these needs.

Strategies for Doing Well in this Course

To do well in the course, you need to keep up with the material. Answer the assigned questions for each chapter. The quizzes I give in some way entice you to learn the material as we go along (and not wait until the last minute). Also, a good study technique is the three R's: Read (the textbook or research articles in this case), Recite (every now and then, recite, orally or in writing, what you just read), and Review (don't assume you know the material after reading and reciting; review the study questions). Also, be able to answer the study questions both ways; i.e., make the answer into a question and see if you could answer that.

Course Materials And Texts

Required supplies
Pencils: 2H (or 3H), for drawing. Eraser if needed.
3-ring notebook (for lab manual)

Recommended supplies
Hand lens ("loupe"), silver metal cover, 10X: available in bookstore. Better (more expensive) hand lens are available for order. I recommend the 10X Bausch & Lomb Hastings triplet, ca. $36; e.g. at www.kooters.com.

Required Books and Manuals:

Optional Books (available in bookstore)

Grading Criteria And Procedures

Percentages of lab practicals or mid-term exams based on total class time for that unit:
Quizzes: 25%
Exam #1: 20%
Exam #2: 20%
Final exam: 25%
Herbarium collection / project: 10%

Letter grades will be assigned according to standard categories: A = 90-100%; B = 80-89.9%; C = 70-79.9%; D = 60-69.9%; F = <60%. The top and bottom 2-3% of each category might earn +/- grades depending on class distributions. No electronic devices (e.g., cell phones, ipads, ipods, calculators) may be used/worn during an exam.
Approximate Due Dates For Major Assignment Or Exams

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>25 Feb</td>
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<tr>
<td>Exam 2</td>
<td>12 Apr</td>
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<tr>
<td>Herbarium collection labels due</td>
<td>6 May</td>
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<tr>
<td>Lab Practical #3</td>
<td>8 May</td>
</tr>
<tr>
<td>Final Exam</td>
<td>13 May</td>
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</table>

Goals and Expectations

Although I teach this course with the attitude of training you as plant taxonomists, you will inevitably forget many of the details of this material. But, I hope that you will retain the big ideas: 1) appreciate the beauty and intricacy of plants and enjoy discovering aspects of nature; 2) improve your skills in memory, observation, writing, and critical thinking; 3) gain a useful, base knowledge of the structure, function, and evolutionary history of plants; 4) learn how scientific research is conducted and present the findings of research through application.

Technology Utilized

Blackboard <http://blackboard.sdsu.edu> will be used to post grades, research articles, and assignments. Other resources are at the Plant Systematics Resources web site <http://www.sci.sdsu.edu/plants/plantsystematics> and the course web site <http://www.sci.sdsu.edu/plants/tax/index.htm>

Classroom Procedure

Please bring your textbook and lab manual to every class. Arrive to class on time, 8:00 am, and plan to stay for the full period of the class, ca. 11:40 am. If you are late, come right in and sit down while I'm talking. (But note that quizzes start at 8:00 am and are taken up at about 8:10 am.) Turn off all cell phones (no texting!) during lecture and lab (you may use them outside the classroom or during the break) and keep laptop computers closed unless we are doing a specific computer exercise. Discussion about plant taxonomy is expected and encouraged, but always interact with me and other students in a respectful and civil manner. Keep personal conversations to a minimum. (Go outside if you feel so compelled.) Most people, including me, require quiet and absence of distractions in order to focus on something. Feel free to go to the restroom if needed; just try to avoid doing so during the first hour and after ca. 11:00 am. Always be neat and clean up your area completely at the end of class; use the hand brush as needed. Note: Be aware that you are responsible for all lecture notes, supplements, and additional readings for the exams. If you miss a class, you are responsible for making up that missed lab and for getting homework assignments and supplements.

There are times when we will do exercises with computers, and I will ask you to bring your laptop (if you have one) to class. Please, no personal use of computers during class (that includes emailing and checking web sites not related to class activities). You may do this during the break; otherwise, go outside the classroom.

I'm sorry, but due to liability concerns, no friends, relatives, or pets can go on class fieldtrips. No smoking on any fieldtrips (campus or otherwise); it is both discourteous/unhealthy to others and a potential fire hazard. Cheating will not be tolerated in this class. Any evidence of cheating will result in a minimum of a zero for that exam/quiz and a report to the judicial board of SDSU.

Homework Assignments

Most homework assignments are to answer select Chapter Review Questions (see Schedule for which ones) for a topic. This will be graded (each counts as 1/2 quiz) and are important to study for quizzes and exams.

Quizzes

Quizzes will be given often, in class or in the field. Their purpose is test your knowledge and to help you to keep up with the material in the course. Quizzes start at 8:00 am sharp and are taken up at ca. 8:10 am, and there are no make-ups (except under extenuating circumstances). So, it's important for you to arrive to class on time. The lowest quiz grade is dropped, so you do have one reprieve for being late or ill; there will generally be no makeup for quizzes. Questions answered as an assignment may count as the equivalent of one quiz. One quiz grade (the lowest) will be dropped. Assume that you will have a quiz in the field on every field trip.
Exams
These will generally consist of a lab practical followed by a lecture exam. Lab practicals consist of on-site identification of plants and plant parts and identity of major group, family, and/or species. The first portion of the lab practical consists of a number of stations, with a 1.5–2 minute time period to answer the questions at that station. General questions are: what is this? to what major group/family/genus/species does this belong? Some lab practicals may include material for dissection and identification and a more lengthy elaboration of features of that material. The lecture exam covers facts and concepts of lecture material only (although in this course, lecture and lab intergrade). The exams will mostly entail rote response of information, with many questions directly or modified from the chapter review questions. But some questions will demand a degree of synthesis. The typical format for lecture exams will be short answer, short essay, and usually one longer essay question, synthesizing information from several facets. Grading for essay questions will be based in part on organization, grammar, and prose. Thus, it is strongly suggested that you spend a minute or two jotting down an outline of what you wish to say before you begin writing.

Herbarium Collection / Project
A herbarium collection of 5-10 specimens will be required of all enrolled students. Generally, students will collect with the instructor on one of a few independent trips to a specific region (to be determined). Additional specimens may be collected as part of a floristic survey of a general region, e.g., a canyon in San Diego County, in which all plants in the area are collected, with documentation (to be discussed). Alternative, extra projects, for the interested/advanced student might involve a taxonomic problem, such as evaluating the validity of a subspecies versus a species or annotating our specimens of a particular group (e.g., a family or genus).

Herbarium specimens (with final label) are due on the dates indicated unless otherwise indicated. Late specimens will result in a 10% decrease per day of that herbarium grade. Mounting is mandatory!

Photography
I wish to emphasize photography, both in the lab and on field trips. Some of you may wish to photograph plants in the field or in the lab. I will ask that you download images to add to our web page. In addition, a color print makes a nice addition to an herbarium sheet. It is important to practice, in order to get good depth of field and crisp focus; a flash is often useful.

I will also encourage high magnification shots (e.g., of small flowers or flower parts) using the photodissecting microscope in the lab.

Field Trips
This is largely a field course. Thus, scheduled field trips are mandatory and extremely important. Don't miss them! Missing a field trip will (in addition to a missed quiz) result in the following percentile reductions in your final grade: half-day class/weekend field trip: 2.5%; full-day weekend field trip (desert or mountain trips): 5%. (A make-up may be possible, but don't count on it.)

Some field trips will be during the class period. In general, you will be responsible for your own transportation to local sites. There may be a couple of optional field trips, which you may attend if you wish; these will be a good opportunity to collect for your herbarium.

Be field hardy! Wear appropriate clothing: light-weight boots or tennis shoes (preferably with good tread); pants and shirt you don't mind getting dirty or scratched up; hat, jacket, sunblock, sunglasses, etc. as appropriate. If rain is even a remote possibility, bring a rain jacket; we won't let a little drizzle stop us! Be ready to go in the field as soon as we arrive at a sight. You should plan to bring water and a snack on all field trips. Bring a lunch and drinks for the all-day weekend field trips; you may bring a small ice chest, or share with someone else.

Bring the following to the field:
- Plant Collection and Documentation Field Notebook or forms (in lab manual); pencil
- Checklist of the Vascular Plants of San Diego Co.
- Class Species List (I suggest making copies of appropriate pages to be taken into the field.)
- Hand lens (on cord around neck is handy)
- Portable plant press.

In the field, don't wander off alone or far away from the bulk of the class. Be cautious and use common sense. Watch out for snakes! Don't reach for a plant without looking over the area. Even though we will always collect in areas where collection is allowed, be discrete about it.

Despite all of the above precautions and rules, you can still have fun. We will be visiting some beautiful areas, so enjoy the wildlife and your time in the field.
## Class Schedule (subject to change)

<table>
<thead>
<tr>
<th>Date</th>
<th>Exams / Lecture Topic</th>
<th>Lab or Field Topic / Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Th Jan 22</strong></td>
<td>Ch. 1 Plant Systematics and Evolution: an Overview; Ch1: Q1-32; Ch. 16 (Botanical Names, pp. 620-623): Q53-67</td>
<td>Lab 1: Pl. Syst.; Spp. 1-5</td>
</tr>
<tr>
<td><strong>T Jan 27</strong></td>
<td>Ch. 4 Lycophytes, Ferns; Ch4: Q1, 2, 27, 32, 36-38, 39, 43-49, 54-59, 69-75, 85</td>
<td>Lab 4: Ferns; Spp. 6-10</td>
</tr>
<tr>
<td><strong>Th Jan 29</strong></td>
<td>Ch. 9 Plant Morphology: Roots, stems, leaf structural types Ch9: Q1-19, 134</td>
<td>Ch. 9: Root, stem, lvs; Spp. 11-15</td>
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<tr>
<td><strong>T Feb 3</strong></td>
<td>Ch. 9 Plant Morphology: Leaves Ch9: Q20-31; 128-132</td>
<td>Lab 9: Leaves. Spp. 16-20</td>
</tr>
<tr>
<td><strong>Th Feb 5</strong></td>
<td>Ch. 9. Plant Morphology: Leaves, general terms Ch9: Q98-117; 118-127</td>
<td>Lab 9: Leaves. Spp. 1-25 Review</td>
</tr>
<tr>
<td><strong>Sa Feb 7</strong></td>
<td>FIELD TRIP: 8:00-12:00, Mission Trails Reg. Park-Cowles Mtn., fr. Barker Way, switchback trail [Rain date: Su Feb. 8]</td>
<td>FIELD QUIZ: Spp. 1-24</td>
</tr>
<tr>
<td><strong>T Feb 10</strong></td>
<td>Ch. 6 Flowering Plants; Ch. 9 Plant Morphology: Flowers &amp; inflor., gen. Ch6: Q1-21; Ch9: Q32-58, 96-97, 133</td>
<td>Lab 9: Flowers. Spp. 25-31</td>
</tr>
<tr>
<td><strong>Th Feb 12</strong></td>
<td>Ch. 9 Plant Morphology: Flowers &amp; inflor., gen. Ch9: Q59-80, 135, 136</td>
<td>Lab 9: Flowers. Spp. 32-37</td>
</tr>
<tr>
<td><strong>T Feb 17</strong></td>
<td>Ch. 9 Plant Morphology: Fruits &amp; seeds, gen. Ch9: Q81-95</td>
<td>Lab 9: Fruits &amp; Seeds. Spp. 38-44</td>
</tr>
<tr>
<td><strong>Th Feb 19</strong></td>
<td>Ch. 9 Plant Description, Review</td>
<td>Appendix 1: Description Exercise Scavenger Hunt; Spp. 45-51</td>
</tr>
<tr>
<td><strong>Sa Feb 21</strong></td>
<td>FIELD TRIP: 8:00-12:00, Mission Trails Regional Park Old Mission Dam region [Rain date: Su Feb. 22]</td>
<td>FIELD QUIZ: Spp. 26-51 (+1-25)</td>
</tr>
<tr>
<td><strong>T Feb 24</strong></td>
<td>EXAM #1: Chs. 1, 4, 6, 9, 16 (Botanical Names); spps. 1-51</td>
<td>Assign: Ch15: Q (all)</td>
</tr>
<tr>
<td><strong>Th Feb 26</strong></td>
<td>California Plant Communities Ch. 15 Identification: Q1-16; Chs. 7-8 Angiosperms. Keying.</td>
<td>Handout; Lab 15: Plant Identification Assign: Ch18: Q(all); Spp. 52-57</td>
</tr>
<tr>
<td><strong>T Mar 3</strong></td>
<td>Ch. 18 Herbarium Use; Chs. 7-8 Angiosperms. Keying.</td>
<td>Lab 18: Herbaria. Databases, labels. Assign: Ch17: Q(all); Spp. 58-64</td>
</tr>
<tr>
<td><strong>Th Mar 5</strong></td>
<td>Ch. 16 Nomenclature: Q1-29 Chs. 7-8 Angiosperms. Keying.</td>
<td>Lab 16: Nomenclature. Lab 7-8: Angiosperm families. Spp. 65-70</td>
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<tr>
<td><strong>Th Mar 12</strong></td>
<td>FIELD TRIP: 8:00-11:00 am, Torrey Pines State Park [Rain date: T Mar. 17]</td>
<td>QUIZ: Spp. 52-77 (+ extra credit: 1 sp. 1-51)</td>
</tr>
<tr>
<td><strong>T Mar 17</strong></td>
<td>Chs. 7-8 Angiosperms. Keying. Desert Plants</td>
<td>Lab 7-8: Angiosperm families. Spp. 78-84</td>
</tr>
<tr>
<td><strong>Th Mar 19</strong></td>
<td>Ch 17 Plant Collecting; Chs. 7-8 Angiosperms. Keying. Desert Plants</td>
<td>Lab 7-8: Angiosperm families. Spp. 85-92</td>
</tr>
<tr>
<td><strong>T Mar 24</strong></td>
<td>Chs. 7-8 Angiosperms. Keying. Desert Plants</td>
<td>Lab 7-8: Angiosperm families. Spp. 93-100</td>
</tr>
<tr>
<td><strong>Fr Mar 27</strong></td>
<td>FIELD TRIP: 7:00am-5:00pm, Anza Borrego Desert State Park</td>
<td>QUIZ: Spp. 78-108</td>
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<tr>
<td><strong>Sa Mar 28</strong></td>
<td>FIELD TRIP: 7:00am-5:00pm, Anza Borrego Desert State Park</td>
<td>QUIZ: Spp. 78-108</td>
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<tr>
<td><strong>Mar 31 - Apr 4: Spring Recess &amp; Holiday</strong></td>
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<tr>
<td><strong>T Apr 7</strong></td>
<td>Specimens, labels; Estuary Plants</td>
<td>Spp. 136-140</td>
</tr>
<tr>
<td><strong>Th Apr 9</strong></td>
<td>Chs. 7-8 Angiosperms. Keying. Estuary Plants. Review.</td>
<td>Spp. 141-146</td>
</tr>
<tr>
<td><strong>T Apr 14</strong></td>
<td>EXAM #2: Ch. 5, 7 (families), 8 (families), 15-18, Calif Plant Communities, Desert Adaptations; Spp. 52-106</td>
<td></td>
</tr>
<tr>
<td><strong>Th Apr 16</strong></td>
<td>Chs. 7-8 Angiosperms. Keying. Estuary Plants.</td>
<td>Spp. 147-155</td>
</tr>
<tr>
<td><strong>T Apr 21</strong></td>
<td>FIELD TRIP: Tijuana Estuary: 8:00 am - 11:00 am QUIZ: Spp. 132-152; [Rain date Th Apr. 23]</td>
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<tr>
<td><strong>Th Apr 23</strong></td>
<td>Ch. 5 Gymnosperms-Conifers &amp; Ephedraceae; Mountain Plants; Chs. 7-8 Angiosperms. Keying</td>
<td>Spp. 156-166</td>
</tr>
<tr>
<td><strong>T Apr 28</strong></td>
<td>Chs. 7-8 Angiosperms. Keying. Mountain Plants</td>
<td>Spp. 167-178</td>
</tr>
<tr>
<td><strong>Th Apr 29</strong></td>
<td>Chs. 7-8 Angiosperms. Keying. Mountain Plants</td>
<td>Spp. 179-192; Herbarium Labels Final Printing, Final collection due!</td>
</tr>
<tr>
<td><strong>Sa May 2</strong></td>
<td>FIELD TRIP: 8:00am - 5:00pm, Cuyamaca, Laguna Mtns. (Rain or shine, unless a torrent, then rain date Su 3 May)</td>
<td>QUIZ: Spp. 156-192</td>
</tr>
</tbody>
</table>
May 5 Review; final labels due

May 7 Lab Practical #3: Plant Family Identification (Tentative)


May 14 Mounting party! (10 am-12 noon): Optional (will only take 5-10 minutes per student; two stations set up) Herbarium specimen mounting

Other Books on Plants of California and Adjacent Regions:
Jaeger, E. C. 1941. Desert Wild Flowers. Stanford University Press, Stanford, California. [NOTE: Nomenclature is outdated, but descriptions and line drawings are very useful.]
Wiggins, I. L. 1980. Flora of Baja California. Stanford University Press, Stanford, California. [NOTE: Needs work, but the only major manual available of this region.]

Books on Cultivated Plants:

Major References for Flowering Plant Family Descriptions and Relationships: