

## BIOL 311 & 311L FIELD BOTANY & LAB

### Course Syllabus

**Semester/Year:** Spring 2021

**Units:** 4.0

**Instructor:** Michael Kunz

**Office Hours:** M 12:00-2:00; TTH 2:00-4:00

**Office Location:** Zoom or other online platform

**Phone number:** 559-453-2045 (message only)

**Email:** [mkunz@fresno.edu](mailto:mkunz@fresno.edu)

**Length:**

16 weeks (January 11 – May 6)

**Schedule:**

Lecture Friday 1:00pm-3:00pm

Lab & Fieldwork Wed 1:00pm-5:00pm

**Rooms:**

Lecture Zoom or other online platform

Lab AIMS Hall 227

### Course Description

Study of vascular plant morphology, taxonomy, physiology and ecology. Emphasis given to field identification, methods of study of plant communities and experimental analysis.

Three weekend field trips required. *Prerequisites: BIOL-121*

### Student Learning Objectives

1. Correctly describe and identify plants in the field or in lab
2. Identify and describe plant communities and vegetation in qualitative and quantitative terms
3. Access online resources such as primary botanical & ecological literature, databases of plant distribution, keys, photographic collections, and horticultural information.
4. Use field equipment to conduct anatomical, physiological and ecological studies of plants in the field (GPS units, pressure chambers, increment cores, infrared gas analyzers, plant presses, etc.)
5. Communicate scientific information in the form of poster presentations that include graphs, tables, illustrations, statistical tests, reference citations and appropriate text. (includes signature assignment)

## Required Resources

- *California Plant Families* by Glenn Keator. 2009. University of California Press. ISBN 798-0-520-25924-9.
  - *Plant Identification Terminology 2e* by James G. Harris & Melinda Woolf Harris. 2001. Spring Lake Publishing; Spring Lake UT.
  - Suitable clothing for field study, including boots, hat & sunglasses
  - Internet access to websites at <http://fpubio.com/kunz/index.htm>, Moodle and the online electronic version of the *Jepson Manual: Vascular Plants of California* available at <http://ucjeps.berkeley.edu/IJM.html>
  - A digital camera or smart phone with capabilities of close-up photography of plant parts.
  - A journal for recording observations and data.
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## COURSE OVERVIEW

California is a temperate-zone global biodiversity “hotspot” and is the most biologically diverse of the 50 United States. Over 6000 vascular plant species exist within our borders; a quarter of them are endemic to California and found nowhere else in the natural world; a quarter of our species are also rare, threatened or endangered. In addition to the diverse and rare nature of our flora, many species are unique, including the tallest (*Sequoia semervirens*), largest (*Sequoiadendron gigantean*) and oldest (*Pinus longaeva*) plants on the planet. This course introduces you to the botanical field study of these unique treasures.

You will learn how to accurately identify plants by their field characteristics. This includes sight recognition of important plant families and the ability to accurately use technical keys and understand technical descriptions. Familiarity with other guides and electronic resources also facilitates accurate identification.

Often, the correct identification of species is only the beginning of field study. Accurate identification of plant communities and the ability to quantify plant vegetation is essential to many environmental studies. In other settings, being able to measure physical and physiological characteristics is important. We will also engage in this aspect of field botany.

Professionals in botanical careers and academic settings must also be able to design experiment, collect data, analyze data, and communicate their findings. A significant part of this course involves presenting the results of field study in the form of herbarium specimens and poster presentations.

The normal pattern for the course will be 2-hour Zoom lectures on Fridays and in-person lab/field experiences on Wednesdays. The lab/field experiences may be in an AIMS Hall biology laboratory, on the FPU main campus outdoors, or rendezvous at a field location. All quizzes and exams will be administered on lab days in the biology lab. Field trips may require additional time during the day. Two field trips will be all-day excursions, and two other optional full-day extra credit field trips can be arranged upon student interest.

Finally, the study of plants takes us to places of beauty and significance. Due to Covid-19 precautions, we will not engage in the multi-day field trips that have been the norm for this class. We will take partial and full-day field trips to some of magnificent and beautiful natural

locations of central California, but unless otherwise noted, students must provide their own transportation and rendezvous at the destination. I hope the course is as aesthetically exciting as it is educational.

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## ASSIGNMENTS, TESTS & GRADING POLICIES

Course grades will be based upon performance on the following items:

<i>Item</i>	<i>Point Value</i>
4 quizzes @ 25 points each	100
2 exams @ 100 points each	200
4 poster presentations of field results @ 50 points each	200
Plant collection	100
2 literature reviews @ 50 points each	100
Field participation	100
<b>Total</b>	<b>800</b>

The final grade will be assigned according to the following percentages of possible points:

<i>Letter Grade</i>	<i>Percent</i>	<i>Points</i>
A	92.5 – 100	740-800
A-	90.0 – 92.4	720-739
B+	87.5 – 89.9	700-719
B	82.5 – 87.4	660-699
B-	80.0 – 82.4	640-659
C+	77.5 – 79.9	620-639
C	72.5 – 77.4	580-619
C-	70.0 – 72.4	560-579
D+	67.5 – 69.9	540-559
D	62.5 – 67.4	500-539
D -	60.0 – 62.4	480-499
F	0 – 59.9	0-479
UW	Attended little or not at all	

If you believe any grade to be in error, please discuss it with me. If you are not satisfied with our discussion, you make take your concern to the dean of this school. Contact me, your program director or your advisor if you feel like you need help with this course.

**QUIZZES:** 4 @ 25 points each focus on using botanical terminology to describe specimens, sight identification of specimens to family, and using keys to identify specimens to specific taxon. Emphasis given to terminology given in Part Two of Harris & Harris; families described in Keator, and key in the Jepson Manual. Quizzes will be administered in the laboratory.

- Quizzes will be taken in-person in the lab.

- Because quizzes and exams emphasize practical applications, it is time-consuming to set up the exams. Quizzes and exams may not be rescheduled except under the most extreme circumstances.
- Cell phones and other electronic devices are not permitted during exams.

**TESTS:** 2 @ 100 points each. Tests will be taken in-person in the lab. Tests incorporate the following:

- Material from quizzes. By the final exam, students are expected to identify 50 common California families by sight, know and use common botanical terminology, and use the Jepson Manual to identify species.
- Recognize and describe common California plant communities.
- Describe, use and interpret results of plant vegetation survey techniques.
- Describe, use and interpret results of plant field physiological, anatomical and physiological techniques.
- Lecture content.

**REVIEW PAPERS (2 @ 50 points each):** 2 short literature review papers on different California species (or one species and one California plant community). I suggest that one be a species that inhabits a community our class will visit and one that inhabits a community we will not observe. Use reference books in the AIMS conference room to identify potential topic species, and get approval for your species choice from me. Papers must reference at least 3 primary sources and follow the APA style. Review papers should briefly introduce the species, describe the methods used to study the species, and discuss the significant findings the research uncovered regarding the species. Paper should be a minimum of 1000 words of text. Papers must be uploaded to the Assignments page of Moodle.

**PLANT COLLECTION (100 points):** The assignment consists of submission of 25 specimens of plants in three formats: (1) pressed herbarium specimens suitable for inclusion in a university herbarium collection; (2) photographic images of selected plants documenting all distinguishing characteristics with scale provided in the image; (3) detailed plant drawings and descriptions submitted within your journal. The basic requirements for the collection are:

- A minimum of 10 plants submitted as herbarium specimens on the day of the final exam.
- A minimum of 5 plants submitted to the Moodle assignment page as photographic image collections.
- A minimum of 5 plants submitted as be journal drawings submitted on the day of the final exam.
- The remaining 5 plants may be submitted in a format of your choice.
- All plants must be wild specimens; cultivated plants are not acceptable.
- At least 20 different families must be represented (i.e. no more than 5 plants may be duplicates of the same family).
- At least 5 specimens must be trees, shrubs or non-flowering plants.
- A field journal documenting all essential information must accompany the collection.
- Grading rubrics for the submissions are given on the course fpubio.com web site.
- Collections are due on the date of the final exam.

Additional information is supplied at the course web site.

**PARTICIPATION:** Credit (100 points) is awarded for hours attended in class, lab & field. The course is offered over 15 weeks, with six hours of lecture and lab normally scheduled = 90 hours for full credit. Missed hours will be subtracted from the participation credit at 1 point per hour.

Field trips may be used to compensate for missed hours or given extra credit (up to 10 hours per day) up to a maximum of 120 total participation points.

**POSTER PRESENTATIONS (INCLUDING SIGNATURE ASSIGNMENT):**

Over the course of the semester, we will collect field data using floristic & vegetation surveys and physiological, anatomical & morphological measurements. Four of these sets of data will be used as the basis for poster presentations. The posters are similar to a scientific research paper, but are condensed and include a minimum of written information. Three of the posters may be submitted by groups of 2 – 3 students. **One poster must be submitted individually, and this individual poster constitutes the signature assignment for the course.** One poster must also be submitted as an FPU Research Day Poster Presentation.

The assignments must adhere to the following guidelines:

- Posters must be submitted electronically the Campus Cruiser Assignments page as PowerPoint slides sized to 3 feet x 4 feet. The poster submitted to the Research Day must also be printed on a banner printer.
- Posters must be organized in traditional research paper format with descriptive title, abstract, introduction, methods/materials (including study site, if appropriate), results, discussion & literature cited. Print must be in 24 point font or larger. To fit your text onto the poster, you must edit your writing to be as **SUCCINCT** as possible while still conveying essential information. Carefully review APA guidelines and suggestions for writing scientific papers (such as in Sylvia McMillan’s *Writing Papers in the Biological Sciences*, or other similar references).
- Posters should include illustrative figures (e.g. a digital picture of the study site, plant species, map, investigator using equipment, map of study site, etc.) and graphical figure and/or table summarizing results or other pertinent information.
- Statistical analysis of results included in the results section.
- A few key citations and references.

Category of evaluation		
Written expression	4 (excellent)	Each section of the poster includes essential, appropriate textual information presented in appropriate style and free of mechanical errors.
	3 (good)	Style and information follows scientific format, but may lack some essential information or misplaces information or lapses in style or contains mechanical errors
	2 (fair)	Style and information generally appropriate, but some significant lapses mar the overall quality of the poster
	1 (poor)	Major omissions of essential information exist, fails to follow proper style, or contains numerous mechanical errors in writing
Scientific content	4 (excellent)	Purpose clearly stated, experimental design appropriate; adequate data collected for analysis; correct statistical analysis and graphical summary of results; appropriate conclusions drawn from data
	3 (good)	Poster includes all appropriate aspects of content, but minor omissions or mistakes may be present.
	2	More serious omissions or errors present in one or two aspects

	(fair)	of scientific content.
	1 (poor)	Numerous significant omissions or errors present with respect to scientific content.
Visual presentation	4 (excellent)	Text and figures balanced in emphasis; various sections of the poster clearly distinguishable; flow of content easy to follow; graphs, figures and tables appropriately labeled and scaled; overall style and background attractive and interesting.
	3 (good)	Visual presentation generally good, with only minor deficiencies that prevent it from being visually attractive and balanced.
	2 (fair)	A more serious deficiency exists in visual presentation, such as difficulty in following the organization of the poster, or difficulty in reading or interpreting material, or graphs/figures incorrectly presented, or little attention given to overall appearance of the poster
	1 (poor)	More than one serious deficiency exists in the visual presentation of the poster

Posters will be evaluated using the following rubric:

Grades are to be assigned with the following minimum expectations:

- An “A” poster is excellent in all categories of evaluation.
- A “B” poster is good in all categories or, if fair in one, compensates with excellence in another.
- A “C” poster is fair in all categories or, if poor in one, compensates with excellence in another.
- A “D” poster is fair in at least two categories.
- An “F” poster is poor in more than two categories.

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### **TENTATIVE COURSE SCHEDULE AND OUTLINE OF TOPICS (SUBJECT TO CHANGE!)**

<b>DATE</b>	<b>TOPIC</b>	<b>LOCATION</b>
Jan. 13	Introduction, orientation; Lab: Plant reproductive structures	Campus
Jan. 15	Plant life cycles and major groups of plants	Zoom
Jan. 20	Lab: Plant vegetative structures	Campus
Jan. 22	Introduction to plant families	Zoom
Jan. 27	<b>Quiz #1</b> Plant identification; using dichotomous keys	Campus
Jan. 29	Plant communities & vegetation survey techniques	Zoom
Feb. 3	Sierra Foothills field trip – vegetation survey	Sierra foothills (late return)
Feb. 5	Vegetation survey analysis	Zoom
Feb. 10	Plant families identification	Campus
Feb. 12	Plant communities	Zoom
Feb. 17	Plant collecting and/or vegetation survey	Valley & foothills (late return)

Feb. 19	Plant physiology	Zoom
Feb. 24	<b>Poster #1 due; Quiz #2;</b> Plant physiology data collection	campus
Feb. 26	Review	Zoom
Mar. 3	<b>Mid-term Exam</b>	campus
Mar. 5	Plant physiology analysis; <b>Literature review #1 due</b>	Zoom
Mar. 8-12	<b>MID-SEMESTER BREAK</b>	(Extra credit field trip?)
Mar. 17	Plant collection work; field data analysis	campus
Mar. 19	<b>Poster #2 due;</b> Plant families & communities	Zoom
Mar. 24	Plant collecting and vegetation survey	Valley & foothills (late return)
Mar. 26	Field data analysis	Zoom
Mar. 27	<b>FULL DAY FIELD TRIP</b> (full day; early & late return)	Table Mountain & Black Mountain
Mar. 31	<b>Quiz #3;</b> Plant identification & plant collection work	campus
Apr. 2	<b>GOOD FRIDAY HOLIDAY</b>	
Apr. 7	Data analysis; plant collection work	campus
Apr. 9	Plant families & communities	Zoom
Apr. 14	<b>Quiz #4;</b> Field data analysis; plant collection work	
Apr. 16	<b>FULL DAY FIELD TRIP;</b> early departure & late return	Central California Coast
Apr. 21	Plant collection and/or field data collection	San Joaquin River Gorge (late return)
Apr. 23	Field data analysis; <b>Literature review #2 due; Poster #3 due</b>	Zoom
Apr. 24	(SATURDAY FULL DAY FIELD TRIP; early & late return?)	(Extra credit field trip?)
Apr. 28	Plant collection work; Review	campus
Apr. 30	<b>Poster #4 due;</b> Review	
May 5	<b>FINAL EXAM; plant collections due</b>	

## SUGGESTIONS FOR SUCCESS IN THIS COURSE

- The course website at [http://fpubio.com/kunz/field\\_botany/index.html](http://fpubio.com/kunz/field_botany/index.html) offers links to electronic database resources. Use them to assist your learning.
- Success in a course requires a realistic allocation of time for readings, assignments, and study. The accepted standard is 3 hours of time per unit per week of instruction. This is a 4 unit course offered over 14 weeks, so the expected amount of time devoted to the class should be  $4 \times 3 \times 15 = 168$  hours. This is the amount of time expected for an **average** student with an **average** science background desiring an **average** grade. Students with less aptitude or background or who desire a superior grade may need to devote more time. Students with exceptional aptitude or strong background may in some cases succeed with less time devoted to the course. The following table offers a summary overview of the typical time expected for this class:

<i>Assignment</i>	<i>Est. Time to complete (hours)</i>
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<i>Assignment</i>	<i>Est. Time to complete (hours)</i>
15 weeks @ 6 hours lecture, lab and field per week	90
2 review papers @ 8 hours each	16
4 digital posters @ 6 hours each	24
Plant collection and work outside of scheduled lab/field	15
4 quiz preparation @ 5 hours each	20
2 exam preparation @ 10 hours each	20
<b>TOTAL</b>	<b>185</b>

### UNIVERSITY POLICY SUMMARIES

Students are responsible for becoming familiar with the information presented in the Academic Catalog and for knowing and observing all policies and procedures related to their participation in the university community. A *University Policy Summary* may be found on the university website at <http://registrar.fpu.edu/catalog>