BIOL R155L: PRINCIPLES OF BOTANY LABORATORY

Originator
mnicholson

College
Oxnard College

Discipline (CB01A)
BIOL - Biology

Course Number (CB01B)
R155L

Course Title (CB02)
Principles of Botany Laboratory

Banner/Short Title
Principles of Botany Lab

Credit Type
Credit

Start Term
Fall 2021

Catalog Course Description
This course involves laboratory and field studies of the characteristics and relationships of selected plants from the major divisions. Students will learn the principles of taxonomy, and will gain practice in identification of species by means of keys. This course will offer an introduction to the basic experimental techniques and instrumentation used in the investigation of plant physiology.

Taxonomy of Programs (TOP) Code (CB03)
0402.00 - Botany, General

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will be required

Faculty notes on field trips; include possible destinations or other pertinent information
Field trips will focus on local destinations that offer distinct habitats or communities of plants. Possible field trip destinations include local parks, beaches, natural areas, botanical gardens, harbors, islands, natural history museums, and aquaria.

Grading method
Letter Graded

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture

Activity

Laboratory
Minimum Contact/In-Class Laboratory Hours
52.5
Maximum Contact/In-Class Laboratory Hours
52.5

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5
Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
52.5
Total Maximum Student Learning Hours
52.5

Minimum Units (CB07)
1
Maximum Units (CB06)
1

Prerequisites
BIOL R155 or concurrent enrollment

Entrance Skills

Entrance Skills
Understanding of the characteristics of plants, fungi, and photosynthetic protistans and the ability to recognize various plant structures and relate the structures to functions.

Prerequisite Course Objectives
BIOL R155-Demonstrate an understanding of characteristics of plants, fungi, and photosynthetic protistans, and their phylogenetic relationships.
BIOL R155-Describe the structural organization of major plant, fungal, and photosynthetic protistan taxa.
BIOL R155-Identify and describe plant structures and relate them to their functions, including transpiration, photosynthetic pathways, and energy and nutrient acquisition.

Requisite Justification

Requisite Type
Prerequisite

Requisite
BIOL R155

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Closely related lecture/laboratory course

Requisite Type
Concurrent

Requisite
BIOL R155

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Closely related lecture/laboratory course

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	Demonstrate the ability to use a dichotomous key to identify plants to family, genus, and species.
2	Explain, compare, and contrast the anatomical and morphological characteristics of plants, fungi, and photosynthetic protists.
3	Demonstrate the ability to prepare plant and fungi specimens for microscopic examination.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Identify plant structures and functions across a diversity of plant, fungal, and photosynthetic protistan groups using macroscopic and microscopic methods.
2	Identify the major plant, fungal, and photosynthetic protistan groups by sight and be able to use dichotomous keys to identify land plants to the genus level.
3	Explain trends in development and evolution between major groups of plants, fungi, and photosynthetic protistans, and with specific plant structures and features.
4	Provide evidence of competence with various laboratory techniques employed by the plant biologist, including basic chromatography, free-hand sectioning of samples for microscopic analysis, and simple staining techniques for lignin and cellulose.
5	Apply scientific methodology and reasoning through active experimentation and experiences.

Course Content

Lecture/Course Content

1. Gross morphology of plants
2. Plant tissue structure and function
3. Absorption (nutrients/water)
4. Transpiration
5. Taxonomy
6. Field survey techniques
7. Photosynthesis
8. Respiration
9. Plant molecular genetics
10. Embryonic development
11. Plant communities
12. Plant ecology

Laboratory or Activity Content

1. Use of experiments to explore course topics (e.g., photosynthesis, phototropism, apical dominance).
2. Application of the scientific method (i.e., hypothesis testing and experimental design) to understand plant biological functions (e.g., how soil fertility influences plant growth).
3. Microscopic and comparative anatomy for representative organisms from plant, fungal, and photosynthetic protistan phyla.
4. Comparative study of functional morphology for representative organisms from plant, fungal, and photosynthetic protistan phyla.
5. Comparative study of physiology for representative organisms from plant, fungal, and photosynthetic protistan phyla.
6. Comparative study of developmental stages and life cycles for representative organisms from plant, fungal, and photosynthetic protistan phyla.
7. Mechanisms and patterns of evolution of plants and plant relatives.
8. Classification schemes and use of classification tools (i.e., dichotomous key usage).
9. Measures of species diversity and richness (i.e., ecological studies).
10. Appropriate statistical analysis of data.
11. Population growth modeling (e.g., ecological and evolutionary studies).

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Essay exams
Essays
Group projects
Individual projects
Laboratory activities
Laboratory reports
Objective exams
Projects
Problem-Solving Assignments
Problem-solving exams
Quizzes
Reports/papers
Research papers
Skills demonstrations
Skill tests
Simulations

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Computer-aided presentations
Collaborative group work
Class activities
Class discussions
Distance Education
Demonstrations
Field trips
Group discussions
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Internet research
Laboratory activities
Small group activities

Describe specific examples of the methods the instructor will use:

1. Live or video presentations of key exercises, such as those demonstrating spectrophotometry, plant identification, .
2. Demonstrations of experimental processes and equipment use, such as producing a thin cross-section of a leaf for microscopic examination, or setting up and using a transect for a sampling study.
3. Demonstrations of some focused exercises such as extraction of essential oils from rosemary or lemon peel.
4. White or black board presentations for discussing how each different laboratory exercises will be performed.

Representative Course Assignments

Writing Assignments

1. Formal lab reports for different laboratory exercises must be composed under the guidelines of scientific reporting formats, with citations and bibliographies as required.
2. Written work frequently requires the incorporation of data in the form of graphs, tables, and sketches (e.g., graph of CO_2 produced during fermentation or sketch of guard cells around a stomate on the surface of a plant leaf).

Critical Thinking Assignments

1. Laboratory work, finished lab reports, and in-class assessments (quizzes and exams) require extensive synthesis of information to allow students to complete the work and then make logical conclusions (e.g., hypothesis testing during lab exercises requires considering an array of explanations, variables, and predicted outcomes).

Reading Assignments

1. Students are assigned pre-lab reading to prepare for pending lab exercises.
2. The instructor will assign support materials or students are directed to relevant review articles in current publications; scientific readings from journals and texts (e.g., American Journal of Botany or Economic Botany) will be required to complete some lab reports.

Skills Demonstrations

1. Students will be required to demonstrate proficiency with the preparation of specimens for microscopic investigations (i.e., thin sectioning, maceration, whole-mount, etc.)
2. Students will be required to demonstrate proficiency with a dichotomous key to identify different unknown plants to family, genus, and species classifications.

Other assignments (if applicable)

1. Field trips (self-guided or group directed) will be arranged whenever possible; sites visited include the local botanical gardens and a variety of ecological zones to showcase specific plant communities (e.g., coastal sage scrub, chaparral, freshwater marsh).

Outside Assignments

Representative Outside Assignments

1. Students may be required to complete advanced preparatory reading for in-class labs.
2. Nominal formalization of lab work may be completed outside of lab, including preparation of tables, graphs, and data summaries, as well as written summaries of protocols related to recently-completed laboratory exercises.

Articulation

C-ID Descriptor Number
BIOL 155

Status
Approved

District General Education

A. Natural Sciences

A1. Biological Science
Approved

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
Fall 2015

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B3 Laboratory Activity
Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

UC TCA

UC TCA
Approved

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 5C: Laboratory Science
Approved

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Manual

Description
James Bidlack & Shelley Jansky. (2017). *Laboratory Manual for Stern's Introductory Plant Biology (14th edition).* McGraw-Hill. New York, NY. ISBN 978-1-260-03014-3

Resource Type
Other Instructional Materials

Description
Paul Young & Jacquelyn Giuffre. (1982). The Botany Coloring Book. HarperCollins. New York, NY. ISBN 978-0-064-60302-7

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Video Conferencing	Zoom/video meetings to allow the instructor to highlight important information (perhaps lecture) and facilitate immediate student interaction (such as problem-solving/question/answer session).
Other DE (e.g., recorded lectures)	Recorded tutorials, lectures, and Zoom/video meetings.
Synchronous Dialog (e.g., online chat)	Instant messaging and/or chat to allow instructor-student and student-student dialogue for teaching and/or studying.
Telephone	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes.
E-mail	Communication venue to allow instructor-student and student-student dialogue for problem-solving/question/answer purposes and to submit certain types of assignments.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
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100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Discussions focusing on a subject for which students will make an original post and then thoughtfully respond to other student postings; may also allow instructor and students to address miscellaneous questions and related subjects.
Video Conferencing	Zoom/video meetings to allow the instructor to highlight important information (perhaps lecture) and facilitate immediate student interaction (such as problem-solving/question/answer session).
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Examinations

Hybrid (1%–50% online) Modality
Online
On campus

Hybrid (51%–99% online) Modality
Online
On campus

Primary Minimum Qualification
BIOLOGICAL SCIENCES

Review and Approval Dates

Department Chair
09/15/2020

Dean
09/16/2020

Technical Review
10/14/2020

Curriculum Committee
10/14/2020

Curriculum Committee
12/09/2020

CCCCO
MM/DD/YYYY

Control Number
CCC000562629

DOE/accreditation approval date
MM/DD/YYYY