

Supplemental Material

CBE—Life Sciences Education
Stanfield *et al.*

Supplemental Materials Index

Fort Ord State park brochure and map

Syllabus for Ecology, Evolution, Biodiversity, and Plants Lab (BIO 211L)

Syllabus for Ecology, Evolution, Biodiversity, and Plants Lecture (BIO 211)

Pre and Post Questions

Final Exam Constructed Response

AAC&U Rubrics

Inferential Statistical Tests



HERE'S HOW THE TOUR WORKS

FORT ORD STOPS & LOCATIONS

You can use your cell phone to call **(831) 998-9458** to learn more about the history of Fort Ord and its cultural and natural features. When you see a sign like the one below, type in the Stop Number listed on the sign. The tour is free, but you will use your cell phone minutes.

Access the mobile web using
<http://myoncell.mobi/18319989458>

[LOCATION]

Cell Tour Stop #

201

(831) 998-9458



California State Parks supports equal access. Prior to arrival, visitors with disabilities who need assistance should call (831) 649-2836.

This publication, including tour stop information, is available in alternate formats.

California State Parks
Monterey District
2211 Garden Road
Monterey, CA 93933
(831) 649-2836
711, TTY Relay Service
www.parks.ca.gov

- 201 INTRODUCTION**
Shelter by the stairs
(parking lot)
- 202 "STILLWELL HALL**
"A Fond Memory" panel
- 203 SUPERFUND CLEANUP**
"Firing Ranges" panel
- 204 MARINE SANCTUARY**
"Protecting a Priceless
Ocean Treasure" panel
- 205 LEGLESS LIZARD**
"Struggling to Survive in
Shifting Sands" panel
- 206 SNOWY PLOVERS**
At the gate in parking lot
- 207 BEACH/RIP CURRENTS**
"A Beach Too Dangerous"
panel
- 209 BUNKERS**
Bunker site
- 210 FIRING RANGE**
Buildings by the road
- 211 PARK PROTECTION**
Shelter by the parking lot
and road leading to beach
- 212 RANGE 8**
"Training to Defend" panel
- 213 FIRING RANGE**
Buildings by the road
- 214 TARGET BUILDING**
Target buildings and
concrete wall

FORT ORD DUNES STATE PARK CELL PHONE TOUR



WOULD YOU LIKE TO LEARN
MORE ABOUT THE HISTORY
AND NATURAL FEATURES
OF FORT ORD?

DO YOU HAVE A
CELL PHONE?

LOOK FOR THE SIGNS
ALONG THE ROAD AND
DIAL **831-998-9458**
TO HEAR
RECORDED MESSAGES.

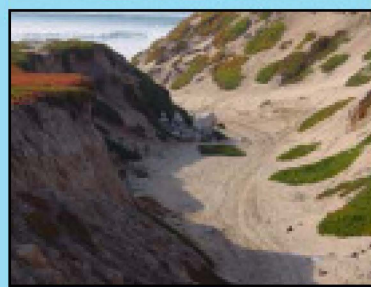
Orientation Map Fort Ord Dunes State Park



Stilwell Hall Site
 Torn down because of coastal erosion, Stilwell Hall was once the soldier's hot spot.



Lookout Point
 Between the hills of Santa Cruz and the shores of Pebble Beach, a tremendous submarine canyon exists in the bay before you.



Beach Access Trail
 Make your way through the dynamic dunes to discover the peaceful sandy beach below.



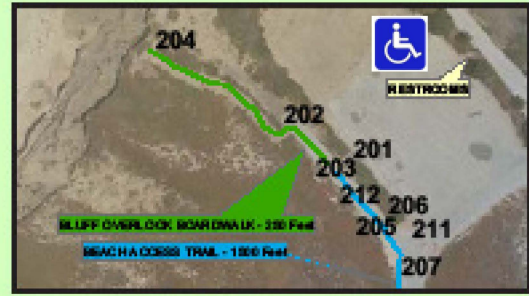
Former Firing Range
 Imagine the exhilarating power of military weapons echoing against the rolling dunes.



Storage Bunkers
 The storage bunkers nestled in the dunes provided a safe place to store volatile ammunition.



Stilwell Hall Area Map



BIO 211L: Ecology, Evolution, Biodiversity, and Plants LAB

Spring 2019 –Syllabus

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Ryan Schoenbaum

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Lab Meeting Time

All lab sections (W 2:00 – 4:50 pm, Th 10:00 – 12:50 pm, Th 2:00 – 4:50 pm, Fr 1:30 – 4:25 pm.) meet in Chapman Science Academic Center (Bldg. 53) room E223.

Course Description

The purpose of Bio211L is to gain a further understanding of Bio211 lecture course content (evolution, the diversity of life, ecology, and plant physiology), how to search and organize a survey of the primary scientific literature, develop an annotated bibliography, and how to conduct ecological research and write about your research in the scientific style of biologists. All the learning in lab will be carried out through activities and hands-on experiences. We will review material covered in lecture to help solidify your knowledge with visual examples and applications. We will also discuss the process of science, conduct literature research, participate in field research evaluating a restoration project, and begin to learn how to write like a professional biologist.

Course Prerequisites

BIO210/L, CHEM111L, and GE Area A1/A2 or equivalents are required prerequisites. Basic computing skills such as MS Word and MS Excel is recommended.

Course Websites

<http://iLearn.csumb.edu> (for lectures, grades, handouts, extra content, etc.)

Texts

Required: McMillan VE. 2016. Writing papers in the biological sciences. 6th ed. Bedford Books: Boston.
(Abbreviated “M” in lab schedule below; the 5th edition is also OK)

Recommended: Raimes A. 2008. Keys for Writers. 5th ed. Houghton Mifflin: Boston. ISBN-13: 978-0-618-75386-4
(for help with English and general writing issues)

Learning Outcomes

This course fulfills area B3 of the general education requirement.

Scientific Writing Outcomes

- Communicate information by planning, drafting, revising, editing, and writing a scientific paper.
- Present the results of your own study in scientific form.
- Read and reflect on scientific papers.
- Use the CSE style to documenting sources within a scientific paper.
- Present an internally consistent argument to support or refute interpretations and conclusions.

Effectively express scientific information in figures and tables.
Summarize and present quantitative data using means, standard deviations, and percentages in tables and figures.
Create questions, hypotheses and predictions consistent with your study.
Create data tables and self-assess the accuracy of the data and subsequent analyses.
Create accurate, on-time, correctly formatted, professional-quality work.

Science GE Outcomes

Describe the essential attributes of the scientific way of knowing and compare and contrast the scientific and popular meanings of "hypothesis", and "theory".
Use the scientific method of inquiry and standard scientific techniques to answer questions about physical, biological, or social processes.
Explain how peer review contributes to the reliability of scientific knowledge.
Locate and use scientific information from both peer-reviewed journals and non-peer-reviewed sources, and identify the qualifications of each source.

Doing Science Outcomes

Have a greater sense of the process of doing science through designing and completing your own biological study.
Effectively work in groups, assuming positions of responsibility when necessary and contributing fairly to group work.
Begin to understand ethical norms in science.
Conduct biological surveys and apply the results to natural resource management issues.
Follow written and oral instructions.

Knowledge Outcomes

- Recognize organisms from the major taxonomic Domains, Kingdoms and Phyla (and in some cases, Classes).
 - Describe characteristics that distinguish major taxa.
- Demonstrate understanding of evolutionary, ecological and plant physiological concepts from lecture and apply them in lab activities.
Demonstrate knowledge of terms, concepts, and processes related to ecology, evolution, plant physiology and biodiversity.
Become aware of the ways that biology is an integral part of your local environment.

Accommodation for Students with Disabilities

Students with disabilities who need classroom accommodations must contact their lab instructor by the second week of classes, either during office hours or by appointment (see contact information on the first page), AND bring your Course Accommodation Form from the CSUMB office for Student Disability Resources (SDR). You can contact SDR through the following channels: they are located in Bldg. 80 (Health and Wellness Bldg), Student_Disability_Resources@csumb.edu, Phone: 831/582-3672 voice, or 582-4024 fax/TTY, <http://sdr.csumb.edu/>

If you have physical limitations that influence your ability to conduct field work or walk on uneven terrain, such as a previous ankle, knee, hip, or back injuries, please contact your instructor by the second week of classes so that we may accommodate your needs during the field trips.

Student-athletes

Student-athletes who will miss class due to scheduled athletic events must contact their lab instructor by the **second week of classes** AND bring a completed *Absence Form* from their coach. Labs and exams cannot be made up. It is important to talk to your instructor before the drop deadline to ensure that your game schedule will not hinder your success in the course. In some cases, missed labs may make it difficult for you to pass, and you should consider taking the course during a semester when you do not have games.

Student Veterans and Active Duty Personnel

Veterans, active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.”

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You will find more helpful information in the VA campus toolkit at <http://mentalhealth.va.gov/studentveteran/>

Discrimination of all types, including sexual misconduct, dating and domestic violence, and stalking

CSUMB is committed to creating and sustaining an environment free of discrimination, including sexual misconduct, dating and domestic violence, and stalking. If you experience discrimination of any kind, CSUMB encourages you to utilize the resources described below.

To report any type of discrimination

- Title IX/DHR (Discrimination, Harassment & Retaliation)
 - 831-582-3510
 - Email: wensmith@csumb.edu (Email is recommended for fastest response)

To report discrimination as a crime and/or safety assistance

- University Police Department
 - Emergencies: 911
 - Non-emergencies: 831-655-0268

For confidential support

- Campus Advocate/Monterey County Rape Crisis Center
 - Call or text: 831-402-9477
 - 24 hour crisis line: 831-375-4357
- Personal Growth and Counseling Center (PGCC)
 - Call: 831-582-3969

Any CSUMB staff or faculty member, other than the campus advocate or PGCC counselors, who are told about student experiences of misconduct must report all known information to the Title IX/DHR office.

Student Email Notification

CSUMB policy establishes email as the primary and official means of communication from California State University, Monterey Bay to students. This includes faculty communication to students and will be used for communication in this course. Students are therefore expected to check their email on a frequent basis. iLearn will also be used as a source of communication. Please visit the course iLearn site at least weekly.

Wellness

CSUMB believes that wellness matters. As a college student, you may sometimes experience problems with your wellness that interfere with academic success and negatively impact daily life. An important part of college is learning how to respond to these problems and seek guidance. Departments within Health & Wellness Services can support you in achieving and maintaining physical, mental, emotional, and spiritual wellness. To learn more about these resources go to csumb.edu/hws.

Grading:

The Bio211L course will be graded on a straight scale, meaning that everyone could theoretically get As. To pass the course with a C- or higher in this course you will need receive at least 70% overall in all of the categories of the “Grade Breakdown” (below). It is important to satisfactorily complete the three major items in lab: annotated bibliography, lab practical and final dune lab in order to pass the course. You need to receive a C- or better in the lab

to fulfill this part of the MLO in ESTP, Marine Science, Biology or Environmental Studies, and to fulfill the science methods part of the Science GE (Area B3).

Plan to complete this course before the end of the semester; incompletes are given for emergencies only. Additionally, university policy states that students are able to withdraw after the 3rd week of classes only for a medical (with a doctor's note) or other very substantive reason (getting behind in your classes is not a viable reason to withdraw).

Grade Breakdown

Class Activities and Participation	25%
--5 pts/day for: active participation in lab, team work, completing in class assignments and quizzes plus Bio in the News on one day	
--Actively engaged in improving scientific writing skills	
Annotated Bibliography	
--Choosing topic, submitting drafts, doing peer review	5%
--Final Annotated Bibliography Paper	15%
Biodiversity	
--Lab Practical Exam	20%
Scientific Paper – the Dune Lab	
--Data Entry & Data Analysis & Drafting & Peer Review	15%
--Final Dune Paper	20%

Grading Scale

97-100%	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
72-76	C
70-71	C-
67-69	D+
63-66	D
60-62	D-
< 60	F

Student Products/Assignments/Resources

Course materials are available on the iLearn website for this course (<http://iLearn.csumb.edu>).

Class Activities and Participation

The participation portion of your grade includes attendance and active participation in lab discussions and activities. Attendance is critical for success in the lab, as many activities build on previous ones and are included in either the lab practical or lecture exams. *A student can miss up to two lab classes (although he/she is still responsible for the content in those missed labs). If a student misses more than two lab sections he/she will lose one full grade for each additional missed lab.*

Participation also includes doing your fair share of group work. During the labs you will be working in groups to conduct simulations, collect data, and answer discussion questions. For the dune lab, you will also be specifically graded on your contribution to field work and data entry and editing. You will evaluate yourself and your peers' contributions and be graded accordingly.

Active participation will also include making detailed notes and drawings or taking photographs during the biodiversity weeks. For example, the best way to prepare for the lab practical is to closely examine all the specimens, taking notes based on the associated text and creating drawings or photographs of the specimen and associated

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figures. Bringing your textbook and your lecture notes will also help you put all of the information into the context of the lectures. We may occasionally ask to see your notebooks so that we may help you focus on topics that need additional study.

Class activities include several computer simulations to enhance your understanding of biological processes. You'll be asked to work in groups completing a worksheet and answering discussion questions related to lecture material. We will ask at least one of these questions to each group at the close of the session. We will assess your responses based on their completeness and accuracy, ability to show appropriate context, and ability to deductively and inductively reason.

Class activities also include a number of short quizzes and assignments such as a syllabus quiz, and in class or in the field quizzes on content.

Class activities and participation also includes the Bio in the News assignment. You will also be asked to connect concepts presented in lab and lecture to current events and research findings. To do this, you will need to find current news or research reports that relate to one of the core topics of the course (evolution, biodiversity or ecology). You will be assessed for presenting a brief summary of the news item during class, explaining how it relates to concepts taught within the course, comparing the primary literature source as to the news summary of the same article for accuracy and understanding, and providing a citation and Internet link to the source of the story via iLearn. You'll do this in teams and provide a short (3 slide) PowerPoint presentation on your story.

Annotated Bibliography

As part of assessing the outcomes for GE Area B3, you will be creating an annotated bibliography on a taxon and/or biological question of your choice (related to the four major course topic areas: ecology, evolution, plant physiology or biodiversity). This assignment has several learning goals: (1) to learn more about one of the taxa or research areas we cover in class, (2) to find and evaluate different sources of scientific information for bias and to evaluate the qualifications of each source, and (3) to become familiar with scientific literature. You'll have the choice of choosing any taxon except those from the Class Mammalia. To help you with this assignment we will go over how to find scientific sources and how to evaluate those sources. You will also learn and use the CSE (Council of Science Editors) bibliographic style. The details of this assignment can be found on iLearn.

The Annotated Bibliography category includes final paper as well as points for submitting a topic and peer-reviewed source in CSE style, submitting a draft of your Annotated Bibliography, and giving feedback to a peer on how to improve his/her bibliography.

Biodiversity: Quizzes, Jeopardy, Active Engagement and Lab Practical Exam

The biodiversity section of the course requires that you learn how to distinguish living and preserved organisms and know characteristics of the major taxonomic groups. The primary assessment of your learning will be with a lab practical exam. To help you prepare for the lab practical we will have graded quiz and in-class "jeopardy" games. The questions will be based on the material presented in previous labs, and will help you learn the types of questions that will be on the lab practical. You will be given points for coming to class prepared and actively engaging in the jeopardy games, your answers on your quizzes, and finally, your active engagement in learning the diversity that is presented each week in lab. This will include creating or studying flash cards and/or taking other notes on each station, reading, learning and discussing with lab mates about the diversity on display.

The lab practical will have ~24 stations of live or preserved specimens representing most of the diversity covered in lab and lecture. Each station will have 2-6 questions about the organism(s) displayed. These can be key characteristics of each taxa, the hierarchical level of that taxon, ecological and/or economic functions of that taxon, and identification of structures visible on the specimen. A study guide will be provided that highlights information you will be required to know. The lab practical is hard. If you don't spend time during each biodiversity lab section looking at all of the specimens, taking notes and quizzing yourselves on the names, characteristics, and features you are using to identify each taxa, you are unlikely to do well.

Ecological research and scientific report (aka The Dune Lab)

The focus of this lab will be on *doing scientific research*. You will be evaluated on your lab and field technique; your ability to collect and enter data; answer a relevant scientific question, conduct analyses to answer the question; and writing a formal scientific paper conveying the results of your analysis. You will be evaluated not only on the final paper you submit but also on completing each of the drafts and participating actively in the peer review process.

As part of meeting the Area B3 GE requirement, we will be discussing doing science and collecting data. The quality of science is only as good as the quality of the data collection, data entry and analysis that goes into conducting research. To support the creation of high quality data, you will be graded on the accuracy and precision of your data, as well as your attention to detail and how well you follow directions. This includes learning all of the common plant species found on the dunes and asking questions whenever you are even faintly unsure about a species ID (guessing is not allowed). This will also include accurate data entry and careful creation of summarized data such as means, standard deviations, and figures. For the field portion of the dune lab, you will be working in pairs to enter and summarize your data. Each member of the team will receive the same grade, therefore it is important to communicate with your lab partner to make sure all data entry is done quickly and well.

While you will be working *in pairs* to conduct field work and enter data, you will work *as individuals* to write up your lab reports. You will devise your own research question(s) to answer, complete your own analysis, and write up your own drafts and final lab report. You will also conduct peer reviews of other students' reports and have your draft reviewed. You need to write thorough, thoughtful peer reviews of at least 2 peers' papers in order to receive full credit. The details of this lab experience can be found on iLearn.

Writing in BIO211L

BIO211L is a more writing intensive course than many science courses. To this end there is a Area A writing prerequisite to the course as well as an assigned "Writing in the Biological Sciences" text. In addition we will have Science Writing Tutors from the Cooperative Learning Center assist students who need more support for writing. There will be [online writing tutoring](#) support for students this semester. Instructors will be identifying students who would most benefit from additional writing support and require them to submit drafts of their papers to online tutoring. Instructors will know whether students did use these services by checking the online tutoring logs. These services are for the benefit of students as being able to write is an essential skill in the vast majority of science-related fields.

Late Policies, Missing Assignments, and Make-Ups

Labs: *There are no make-up labs or exams.* If you need to miss a lab, contact your instructor in advance to see if it is feasible for you to attend a different lab section. (Some days it is easy to have extra people in a lab, other days it is not possible.) You are responsible for material covered on days you miss.

Assignments:

- The final dune lab and the annotated bibliography will be accepted up to two days late with a 20% penalty. *After two days have elapsed you will receive zero credit for the assignment.* These assignments are due by midnight on the date listed below. If something comes up in your life that is influencing your ability to finish your paper on time, please come talk to us before it is due.
- The first dune lab rough draft will be given zero credit if it is submitted after the beginning of lab on the day it is due (in-class peer reviews cannot happen if you do not submit a paper to review).
- You need to submit your peer reviews of each lab mate's dune lab to iLearn by the day after the peer review occurred in class. It is best to turn the peer reviews in during the lab period in which you write them. However we give you an extra day in case the review process takes longer than one lab section. Reviews submitted more than one day after your section will receive zero credit.

If you have a significant problem that comes up that will not allow you to complete an assignment on time, please talk with your lab instructor *before* the day it is due. Although you will be working in teams to collect and analyze the data for the labs, each lab paper should be written in your own words. *Nearly identical lab papers or lab assignments will receive zero points* (and see Academic Integrity section for additional penalties).

Incompletes and Withdrawing from the Course

Plan to complete this course before the end of the semester. [Incompletes](#) will only be given for emergencies and extraordinary situations.

In addition, the current CSU policy is that students will only be able to withdraw after the 3rd week of classes for a medical reason (with a doctor's note) or other very substantive reason. *Not doing well in a course or over extending yourself is not considered to be a substantive reason by the Chancellor of the CSU system.* If you think you may have signed up for too many units, please talk with your instructor during the first 2 weeks of class. For information on the university's withdrawal policy, download the last link on the following web page: <http://ar.csUMB.edu/site/x4671.xml>. The key message is: determine during the first two weeks of class if you

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will have the time and commitment that will be required to succeed in this course this semester (by coming to talk to us if needed).

“Things Happen” Clause

Although we maintain rigorous expectations of everyone in class, we also recognize that serious issues can come up and greatly influence your ability to learn biology. Please come talk with your instructor if such a serious issue comes up in your life. We want to work with you to help you succeed. We can also help to point you toward campus resources that may be helpful from housing to food to support for personal and family issues.

Following Submission Instructions

Part of being a scientist is reading and following instructions. To motivate students to read instructions, we will *take up to 2% off an assignment's total score for inappropriately naming files or submitting files to the wrong location*. Instructions for completing each assignment are given in lab, available on iLearn, or in this syllabus. Please follow these instructions in order to name your files correctly and submit them to the correct locations in the correct form. In all cases your files should have your first name and your last initial as well as the assignment name or description.

Turnitin

In this course, we will use Turnitin.com, an electronic resource that compares your submitted paper to Internet sources and a comprehensive database of other papers (including your peers' papers). It creates an originality report identifying which parts of your essay match any of their sources, making it easy for you to make sure that you have cited all your sources correctly and haven't accidentally used another author's language. If you submit your paper early, you can view the plagiarism score on Turnitin and resubmit if necessary. You should be shooting for scores in the “green” zone (it does not have to be zero or even below 10%). We will be looking for long phrases and sentences that are identical (or nearly so) between your paper and published papers or a peer's paper. If Turnitin is cueing in on words that everyone will use such as “California State Parks” or “point-intercept transect”, don't worry about your score. We will require that all papers be submitted to Turnitin.com for the detection of plagiarism and retained as source documents in the Turnitin.com reference database to be used solely for the purpose of detecting plagiarism of such papers. Further information on how to submit papers to Turnitin.com will be provided later in the semester.

Academic Integrity

Do not engage in activities that undermine academic integrity. **These activities include; cheating, fabrication of data, facilitating academic dishonesty, and plagiarism.** Cheating creates an unfair advantage, usually in one's own interest, and often at the expense of others. This is very different from collaboration which consists of two or more people working together to come up with a common answer that is then recorded in each individual's own words in their own version of a document for later review and revision. If you are confused about the distinction between collaboration and cheating, especially when group work (e.g. lab) is involved, please speak with your instructor.

Academic dishonesty undermines our commitment to maintaining scientific integrity and professionalism; it will not be tolerated. All formal writing assignments will be submitted electronically and evaluated by the instructor using Turnitin.com filtering when necessary. If you are caught engaging in activities that violate academic integrity policy on any assignment, you will fail that assignment, and we will report the violation to Judicial Affairs. If you are caught a second time, YOU WILL FAIL THE COURSE (Indeed not passing either of the major written assignments will almost guarantee failing the course.) If you feel you have been unfairly accused of academic dishonesty, please speak with your instructor. The last thing we want to do is falsely accuse anyone. If we can't resolve the issue or you feel uncomfortable speaking with us directly, you may also speak with the Dean in Bldg. 53/E218 (582-4107), or file an appeal with the Judicial Affairs Officer on campus. For additional information on CSUMB university academic dishonesty policies please refer to the declaration of Academic Integrity located

at:<https://csumb.edu/policy/academic-integrity-policy>

For more information visit:

http://earlyoutreach.csumb.edu/training/ub/Lesson%20%20Ethics/What_is_Plagiarism.doc

<http://library.csumb.edu/instruction/icmodules/understand/>

Professional Conduct

Professional behavior begins in the classroom and creates a productive learning environment. All class members share responsibility for our collective learning process and maintaining a professional demeanor. Unprofessional behavior disrupts the learning environment and is disrespectful to the instructor and your classmates/colleagues. It is essential that everyone feels welcome and comfortable discussing issues in class. So, each class participant is responsible for the following:

- Arrive to class on time, be prepared to actively participate in class and stay until the session concludes.
- Refrain from texting in class. All use of laptops, tablets and smartphones should be related to class content such as taking notes on the provided blank lecture notes. (Note: for personal emergencies, please leave the classroom to check or reply to messages.)
- Be accountable to the instructor(s) and your team mate(s) by coming to class regularly, working collaboratively, staying on task to finish activities within available time and equally contributing to collaborative work.
- Practice common courtesy by actively listening to your peers, speaking one at a time and avoiding interrupting others while they are speaking. Please do not make distracting side comments during class.
- Respect each other's opinions; challenge yourself to be open to views different from your own and avoid blaming, put downs or recriminations of class participants.
- Make sure you allow all class members the chance to speak and/or answer questions. If you have recently answered a question, wait and allow others to contribute before answering again.
- Take responsibility for your own academic success; engage in active learning; provide and accept constructive critique.

Office Hours

We also recommend that you use our office hours. We have the best idea of what material you will need to know to succeed in the class (since we write and grade the quizzes and lab practical, and grade your final papers). We are available at our posted times and also by appointment. If our posted times conflict with your class or work schedules, please talk with us after class or send an e-mail to find additional times that we can meet with you.

Field Trip Safety

When we visit the Fort Ord dunes and backcountry we will be walking off trail on uneven surfaces. Please wear appropriate closed-toed footwear, heavy pants such as jeans, and bring layers for warmth. We will not have access to food, water or restrooms. Please bring your own food and water, and plan to use the restroom before lab begins. Please stay with the large group or your subgroup at all times. When working in subgroups, arrange methods of communication and meeting times with your instructor, and return to the vans ~20 minutes before the end of lab.

Spring 19 BIO211 Lab Schedule

Wk.	Date	Topic	Pre-Class Activity	Assignments Due
1	Jan 23-25	Intro to Bio211L labs, Intro to global climate change		In-class assessment of group work
2	Jan 30-Feb 1	Evo Bio activities: Natural Selection, Sickle Cell anemia, Genetic Drift, Hardy Weinberg	Sadava (S) ch. 20	In-class assessment of group work
3	Feb 6-8	Scientific literacy, Finding sources, Peer Review scientific process - evolution recap Intro to Annotated Bibliography assign	McMillan ch. 1 & skim ch. 4 & 6 Watch Science in Action And Importance of Sci. Literacy	Submit CSE-formatted citation
4	Feb 13-15	Viruses, Bacteria and most "Protists" Discuss common mistakes on Annotated Bibliographies Go over CSE citations	S. ch. 25 & 26	* Discuss annotated bib topic with instructor this week

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5	Feb 20-22	Plants and Fungi	S. ch. 27-29	<i>*In class biodiversity quiz</i> Jeopardy on Viruses through “Protists” <i>* Submit rough draft of annotated bib to forum by Wednesday Feb 20 @ 2pm</i> <i>*Submit online peer review by Saturday Feb 23 @ 11:55pm.</i> <i>*Final Annotated Bibliography due Saturday March 9 @ 11:55pm</i>
6	Feb 27-Mar 1	Animals	S. ch. 30-32	<i>*In class biodiversity quiz;</i> Jeopardy on Viruses through Fungi;
7	Mar 6-8	Lab Practical	Covers all biodiversity	<i>*Final Annotated Bibliography due Saturday Mar 9 @ 11:55 pm</i>
8	Mar 13-15	Intro to the Dune lab		In class assessment of work
9	Mar 20-22	Spring Break – No labs 😊		
10	Mar 27-29	Dune Lab – Learn Plants in the Field	Dune Lab Manual	
11	Apr 3-5	Dune Lab – Collect Restoration Data, Think about research question	Dune Lab Manual McMillan (M) ch. 2 to analyze data, and ch. 3 to create figures for next week	<i>*Data entry due Sat April 6 11:55pm</i>
12	Apr 10-12	Dune Lab – Data Analysis Evaluation of Question & Data Analysis Review expectations of final paper	Review M ch. 4, (Use ch. 2 & 3 to prepare for today)	<i>*Research question and Results with figures &/or tables due before lab starts</i>
13	Apr 17-19	Dune Lab – Peer Review of Question, Results & Discussion	Use M: ch.6 to prepare Lit Cited, use 7 to help revise dune lab	<i>*Complete draft of paper due before week 13 lab</i>
14	Apr 24-26	Plant Anatomy Lab - Monocots and Dicots, Fruits	Use M: ch. 8 to prepare final dune lab (& check lists)	In class assessment of work <i>*Final Dune Lab due April 27 by 11:55 pm</i>
15	May 1-3	Plant Transpiration Lab		In class assessment of work or worksheet due by Friday lecture
16	May 8-10	Pea Seedling Respiration		In class assessment of work or worksheet due by Friday lecture
17	May 15-17	Assessment Week – No Labs		

BIO 211: Ecology, Evolution, Biodiversity and Plant Physiology LECTURE/IN-CLASS
Spring 2019 –Syllabus

Lecture Instructors:

Erin Stanfield - Office: Bldg. 53/Room E318
OH: Mon 12-2PM (**Library 1173**), Wed 11-1:30 (**E318**)

Henrik Kibak - Office: Bldg. 53/Room E309
OH: TBA

Discussion Instructor:

Dr. Suzy Worcester Office: Bldg 53/Room S302
OH: TBA

Office hours also available by appointment

Class Meetings: Lecture: M & W 8:25-9:50 & F 9-9:50; **Discussion:** BIO295-04 & 06; CLC Study Group/PLUS Sessions and Study Hall (see weekly postings)

Lab: Chapman Science Academic Center (Bldg. 53), Room E223. BIO 211L is a required co-requisite. Your instructor's contact information will be available on a separate lab syllabus.

Discussion: Key course content such as doing practice problems for exams and going over exam questions will happen in the discussion sections for this class: Bio 295 section 4 & 6. All discussion sections are taught by Suzy Worcester (sworcester@csumb.edu) and meet in the Library classroom 1128 (behind the Library Cafe).

Additional Course Support:

Cooperative Learning Center (CLC) Study Groups PLUS Sessions: There are several sessions each week dedicated to the difficult concepts in this course and learning strategies to approach the course content Julia Courville, Megan Salomonson, Taylor Perez, and Courtney Faustino are fellow undergraduates who have mastered the content in this class and have been trained to help facilitate your learning. It is highly recommended that you take advantage of these sessions to learn techniques for being successful in this course. They are in the Cooperative Learning Center in the Library, Room 2125. Information about the center, how to sign up for sessions and more is available at <https://csumb.edu/clc>. Sessions start the second week of class

Course Description:

Biology 211 focuses on the diversity of life, the evolutionary biology that unites all life, the form and function of higher plants, and the ecological processes that govern the interactions of living and non-living components of the earth. These concepts are grounded in an exploration of local biology, the role of evolution in biology and human health, and issues in sustainability with a focus on climate change.

Course Prerequisites and Equivalent:

BIO 210 and **210L** (Molecular Cell, Genetics & Animal Physiology) or equivalents, Math 130 (Precalculus) or equivalents, and GE Area A1 (English writing) are required prerequisites.

Students who have already completed BIO240 and BIO240L with a C or better do not need to take BIO211.

Last Day to Add or Drop this Course without a W on your transcript: Feb 4.

Please note that after this day you can only drop this course for "serious and compelling reasons," before 80% of the semester has passed and by **April 17**. FYI: getting behind or not doing well in a class is NOT considered a serious and compelling reason at CSUMB. You'll need to have additional documentation of specific and outstanding factors that impeded you from completing the course. Please budget your time carefully and drop the course by this deadline if you are overscheduled this semester. I will work with each student to help you succeed, but it does require work and planning on the student's part.

Withdrawing after the drop date can only happen for serious and compelling reasons before 80% of the course has been completed (with a W on your transcript) and by April 17.

Required Reading and Resources:

- Sadava D, DM Hillis, HC Heller, SD Hacker. 2017. Life: The Science of Biology. 11th ed. Macmillan Publishers (*E-text option available with LaunchPad homework subscription – see below. This is the cheapest option*).
- LaunchPad – electronic resources and e-text associated with Sadava et al. 11th ed. You can access it directly from within iLearn (*click on picture of textbook cover to access our specific course*). (Note: **do not just google Launchpad**, you will log into some random course but not the course for this class. You need to join *this* course:): <http://www.macmillanhighered.com/launchpad/life11e/10149877>. Use your CSUMB email and

OtterID when you enroll in order to get credit for your LaunchPad work.

- Learning Catalytics –a web-based in-class response system will be used to help us learn what you are learning on a daily basis. More details can be found on iLearn.

Course Websites:

Check <http://iLearn.csumb.edu> before each class period to determine what was assigned and what quizzes you will need to take before that class period. Use the daily outcomes and listed recommendations to help focus your chapter reading and studying for the exams.

LaunchPad (LP): <http://www.macmillanhighered.com/launchpad/life11e/10149877>.

*** Many of the assigned activities are available on Launch Pad. *Be sure to start by going to the iLearn mini-webpage for the next class period to find out what is assigned in LaunchPad.* (Click the icon of the textbook on the Bio211 iLearn page to access Bio211 LaunchPad.)

Curricular Info for Majors in the Natural Sciences and Other Majors

Bio211 fulfills major requirements in the Biology, Marine Science and Environmental Science, Policy and Technology majors. This course fulfills general education area B2 Life Science, but it is not intended for non-science majors. If you are a non-science major or Environmental Studies major, please take BIO204 to fulfill Life Science Area B2 requirement with a general biology course. *You must receive a C- or better in **both** the lecture and lab courses to fulfill this requirement.*

Overarching Conceptual Themes

- *Systems Thinking: Biology is best understood by looking at it as part of a larger system.* The biological processes taught in BIO210 and BIO211 are interconnected with each other and principles from chemistry, physics, economics, and other courses at CSUMB. These central BIO211 principles are also connected to aspects of our daily lives from the foods we eat, to colds we'll catch, to how we commute to campus, and interact with the natural environment. Recognizing and making these connections is often one of the most challenging aspects on exams and deserves practice for proficiency.
- *Evolutionary processes and global climate change are major drivers of biological change.* We will help you to see the connections between evolutionary biology and global climate change applied to many different biological principles and societal issues.
- *Thinking like a Scientist: Evaluating, Interpreting and Providing Evidence to Support Argument.* We will practice critical reading to find evidence to support your arguments throughout the semester as we delve deeper into understanding the interconnections.

Overarching Ecosystem Themes

We will revisit examples from specific ecosystems throughout the semester to connect the concepts at hand to more specific examples. At the top of the iLearn, there is an overview of these ecosystems to provide context to understand the applications of these concepts:

- Coral reefs
- Microbiomes (especially the human microbiome)

Course Learning Outcomes¹:

*By the end of the **Evolutionary Biology Module**, students should be able to:*

- Distinguish between evolution broadly and natural selection specifically
- Recognize and distinguish between the various mechanisms of evolution (mutation, natural selection, gene flow and genetic drift)
- Apply biological evolutionary processes to current real-world issues such as human health, conserving biodiversity and global climate change.
- Describe the steps of speciation from genetic isolation to divergence (via natural selection, mutation and/or genetic drift).
- Decipher and construct phylogenetic trees that depict evolutionary relationships among ancestral and descendent taxa based on molecular, morphological, behavioral or other types of data.

¹ Adapted from: Brownell SE et al. 2014. BioCore Guide: a tool for interpreting the core concepts of Vision and Change for Biology Majors. CBE Life Sci Educ 13:200-211.

- Align sequences and recognize some applications molecular evolution and comparative genomics.

*By the end of the **Biodiversity Module**, students should be able to:*

- Recognize major organismal groups and memorize their distinguishing characteristics.
- Recognize the adaptations that led to major innovations in spread of life across the earth
- Be able to generate and/or label phylogenetic trees with taxa, relevant synapomorphies that unite and distinguish those taxa.
- Recall and evaluate the ecosystem services and utilitarian values gained or lost when specific taxa are substantially reduced or go extinct, or when certain taxa become super abundant.
- Identify and generalize the key roles different taxa play in different ecosystems and how taxa influence ecosystem function.

*By the end of the **Ecology Module**, students should be able to:*

- Identify and describe examples of how behavioral ecology integrates genetics, development, anatomy, physiology, evolution and ecology.
- Explain how populations grow and what factors influence the dynamics of populations.
- Explain how the principle of evolutionary trade-offs is demonstrated in organisms surviving with competing demands for growth, maintenance and reproduction.
- Describe and differentiate species interactions.
- Explain how ecological pressures can be a selective pressure.
- Recognize and explain how/why species abundance and distribution are limited by available resources and by interactions between biotic and abiotic factors.
- Explain why each trophic level of an ecosystem has less energy available than its preceding level and apply this principle to an ecosystems and/or current environmental issue.
- Distinguish, diagram and label how chemical elements are transferred among the biotic and abiotic components of an ecosystem.
- Hypothesize how changes in the amount and distribution of chemical elements can impact the ecosystem.
- Evaluate examples of the scientific evidence that human-caused climate-change is occurring in physical and biological systems.
- Recognize at least five current changes in biological systems that are consistent with climate change hypotheses.
- List several human behaviors that influence climate change and describe how changes in those behaviors would positively or negatively impact climate change.
- Apply ecological principles at the population, community, ecosystem and landscape levels to issues in conservation biology and resource management.

Plant Physiology:

- Explain how plant tissue organization represents an adaptation to sunlight-dependent stationary life in air on a planet with a significant gravitational force.
- Demonstrate an understanding of the concept of source-sink relationships in plants.
- Describe how water and minerals move from roots to shoots.
- Provide detailed examples of the mechanisms that move photosynthates from leaves to sinks.
- Explain the nutritional requirements of plants and how nutrients are extracted from the soil solution and the atmosphere.
- Explain how plant growth is controlled by hormones in response to environmental cues.
- List major examples of hormones and their effects on plant growth and development.
- Recognize plant reproductive structures and how they contribute to reproduction.
- Describe how processes such as meiosis, fertilization, and germination relate to the evolution of plants via natural selection.
- Trace the path of movement of inorganic nutrients from soil into above ground tissues.
- Identify the specific chemical elements in fertilizers and how as a society we have shifted over the years from natural to synthetic fertilizers.

- Describe the roles other organisms play in plant life, from beneficial mycorrhizal fungi to detrimental insects.
- Describe examples of mechanisms that allow plants to communicate with other organisms.

Affective and Course-wide Outcomes:

- Relate biological knowledge to other disciplines and societal context
- Reflect on and evaluate your learning process and best learning strategies
- Critique media for scientific accuracy, understanding and evidence-based thinking.
- Describe how the process of science is used to advance the field of biology.

Accommodation for Students with Disabilities

Students who may need accommodations please see me and bring your Course Accommodation Form from the CSUMB office for Student Disability Resources (SDR). The earlier in the semester (first two weeks of class) that you bring your SDR accommodation form, the easier it will be for you to fully use the accommodations. You can contact SDR through the following channels: Student_Disability_Resources@csumb.edu; Health and Wellness Services Building (Bldg. 80); Phone: 831/582-3672 voice, or 582-4024 fax, or 582-5307 TTY or <https://csumb.edu/sdr>

Lecture Grade Breakdown:

Homework: readings, videos, LP activities, reading quizzes, etc. outside of class) **15%**

Active course involvement: participation and group work (LC and handouts) **12%**
+ a combo of CLC sessions, extra in Discussion section, and/or office hour attendance)

Exams (5) – *Must get >70% on at least two of the following exams:* **73%**

Exam 1: Evolution (Mon 2/11)	13%
Exam 2: Biodiversity (Mon 3/4)	13%
Exam 3: Ecology (Wed 4/10)	14%
Exam 4: Plant Form and Function (Mon 5/6)	14%
Exam 5: Comprehensive Final (Mon 5/13)	19%

Grading Scale:

98-100%	A+	73-76%	C
93-97	A	70-72	C-
90-92	A-	67-69	D+
87-89	B+	63-66	D
83-86	B	60-62	D-
80-82	B-	< 60	F
77-79	C+		

Information and Advice to Succeed in this Course (including detailed lecture grade breakdown)

Class Format

Bio211 is a partially inverted course with the initial learning of basic course content through readings and videos before each class starts. Class time will be focused on reinforcing your conceptual knowledge, guiding you through applications to real-world issues, and helping you integrate content across chapters and beyond the course. In class we will have shorter lectures interspersed with a lot of in-class group work. You will also be quizzed and prompted through learning Catalytics questions to assess concept understanding as we go.

Office Hours

We encourage you to come to our office hours with specific or general questions and to get to know each other better. We want to help you succeed in this class. We also have a better idea of what will be on the exams than your peers do. We also want to know where students are having challenges, so we can improve our teaching. We also are a great resource for internships and guiding you in the right direction for your career plans.

Daily iLearn Mini-web pages

The iLearn mini-web pages are the location to find out everything I emphasize and want you to know for each chapter/day of class. For each day's class the mini-web pages will have:

- specific daily learning outcomes (the main elements we want you to learn from this section)
- Assigned readings/videos
- Assigned pre-class activities in LaunchPad
- Reading/Video Quiz and Warm-up Question (due by 8PM)
- Blank ppt slides that I will fill in during class and a completed version posted after class
- post-class activities to review or reinforce central concepts such as additional tutorials and/or Learning Curve on LaunchPad to review the chapter
- additional study aides and suggestions for doing well on the exam.

How to best prepare for each class

Start at the daily iLearn mini-web page to see the assigned readings and videos. Read the learning outcomes to help you focus your study and assess your learning. Actively read the assigned chapter and watch associated videos. Complete the LaunchPad activities. Take the reading quiz & respond to the warm-up question.

How to best prepare for exams

There are several recommended activities to prepare for exams to do alone and with others in study groups:

- (1) Review your class notes. The class lectures and activities focus will be the focus of the exams.
- (2) Review and practice the activities from discussion and CLC sections. The instructors make sure the content in those sections aligns closely with the exam content.
- (3) Review the learning outcomes on the mini-web pages. Rephrase each outcome into a question and ask yourself if you would know how to answer such a question. This allows you to self-assess if you know the key areas of content. If you don't, review those concepts in your notes, in the text, and/or by reviewing the assigned activities on the mini-web pages.
- (4) Regularly attend and prepare for Discussion, CLC sessions, or our office hours.
- (5) Practice taking multiple choice questions on LaunchPad (Learning Curve or the practice Summative Quizzes).
- (6) Review the overarching themes in the course and ask yourself (and your study group members) how you can relate the content you are currently studying to the overarching themes.
- (7) Complete additional study activities/problem posted on iLearn.

Grade Calculator

Use the grade calculator excel document to regularly to check your grade status throughout the semester. This is important because the iLearn gradebook only shows your final grade based on scores entered to date and thus could be misleading because the last two exams will have a larger influence on your final grade. Use the grade calculator to estimate the effect of getting different scores on upcoming exams and to set goals for yourself and see what effect improving various scores in the course has on your final grade.

Assigned Reading and Homework Activities

Evolution, Biodiversity and Ecology Sections: The daily iLearn mini-web pages describe assigned homework: readings, videos, launchpad activities, and reading/video quizzes and warm-ups due before each class meetings. All assigned homework items are *due by 8 pm* the night before their day in lecture. (In a few cases, we have assigned videos or tutorials from LaunchPad to be done before lab sections. In those cases, all pre-lab online activities are due by 30 minutes before your lab section starts.)

Questionnaires: Weekly iLearn questionnaires are due at the end of most weeks of the course. These questionnaires are a chance for you to identify what you have learned, what you still don't know and also to give us feedback on the course. The process of evaluating what you are learning is called metacognition. The more each of us is able to accurately reflect on what we are learning and what we are not learning, the more effective we are at learning new things in life. You'll get credit for responding to these questionnaires

Homework point allocation: For the homework during the first three sections of the course 30% of the points will come from your LaunchPad activities and 70% will be the daily reading/video quizzes, warm-up questions and questionnaire responses.

Homework Grading: The assigned homework (LaunchPad activities, Reading/Video Quizzes & Warm-ups, and your questionnaire responses) make up 15% of your course grade. **The focus of the pre-class activities is to inspire students to engage with the material, think about course content and be ready to participate in class.** The reading/video quizzes will be graded based on your performance. The warm-ups will be graded based on the thoughtfulness of responses and using evidence to support your thinking. To allow for inevitable issues that come up with life during the semester as well as challenges accessing the internet and technology, I

will automatically subtract a buffer of 10% of the homework points (essentially giving those to you for free) at the end of the semester. Because of this, you do not need to ask us what to do if you miss an assignment or are sick **one day**, those missed assignments will become part of your “freebie” 10%.

Plant physiology homework: TBD

Active Course Involvement

Class Participation

During each class period we carry out activities working alone or in groups to reinforce concepts, apply the concepts to new situations and integrate concepts across chapters.

Learning Catalytics

To facilitate your learning and follow your progress, we use the **Learning Catalytics** classroom response systems on your web-enabled device. We will use your activity in Learning Catalytics to assess preparation in each class session (graded) and your understanding of content during the lecture sessions (not graded for correctness but given points for participation).

In-class Student Teams

We will establish regular long-term teams that you will work with during in-class activities based on students' completion of the “[Getting to know you](#)” Google survey on the first or second day of class (linked on iLearn site). This will both help us get to know you and guide us in creating these teams. We may rotate the membership of these teams during the semester. When we ask you to “get into your teams” on a given day, that is what we mean. Your participation on teams will be evaluated in part by the work you complete as groups provided as in class prompts.

Grading

Your **active course involvement** grade (12% of the course grade) will be based primarily on regular lecture attendance and in-class individual participation (via Learning Catalytics) and in-class group participation (via worksheet). Your in-class participation is worth 10% of your grade. A small part of your grade (2%) is available for just working hard to learn biology and includes any combination of: frequent and/or very active involvement in CLC sessions, doing extra work and being actively involved in Discussion section, and/or getting one-on-one help from Erin, Henrik or Suzy in office hours. We will also consider including showing substantial improvement on the final and/or attending the SNS weekly seminar several times (tell me when you go so I can verify with the attendance role collected each week).

Discussion Sections

The Bio211 Discussion sections (listed as Bio 295, sections 4 & 6) are a key component of this course. The Discussion sections are the place where students will actively prepare for exams by practicing how to approach applied problems and other exam questions, you'll review how well you did on past exams, and spend time applying the course content to larger questions in biology and our daily lives. The ability to apply concepts to real-world scenarios and to interconnect concepts and think broadly is typically the most difficult aspect of this course for most students. The Discussion sections are the primary venue for developing these thinking skills as well as refining course knowledge and practicing other skills which are essential for doing well on the exams. You will learn how to improve answers or re-think how to approach essay questions from lecture activities. The Discussion Section will also be a venue to ask questions when there wasn't time in class. Additionally, in Discussion Section you'll be able to have a voice to consistently give feedback to how the course is going for you and what you are learning as the course proceeds. This feedback will be given to the professors to help improve the course.

You will receive **credit** for attending Discussion section as your Bio 295 grade (or no credit if you don't attend consistently, bring your assigned problem and participate). You can also earn points toward your 2% Active Engagement in Course grade in Bio211 (see more info below) by going above and beyond the minimum expectations to receive credit in your Bio295 Discussion section.

Collaborative Learning Center (CLC) Study Groups

CLC sessions are small, peer-led group study sessions to assist students in approaching the Bio211 content. **All** students are highly encouraged to attend CLC; both high achieving as well as those who are not yet, but seek to be, high achieving. Historically, students who regularly attend CLC sessions for Bio211 are more likely to not only pass, but to do better on exams and in their overall grade. CLC sessions are led by CSUMB students who have already mastered the course material and have been trained to facilitate group sessions. Each week the CLC leaders plan sessions to focus specifically on concepts that students find difficult in this class as well as different strategies for learning the content, improving understanding, working collaboratively on learning strategies, and

preparing for exams. CLC sessions meet several times a week throughout the semester. All CLC attendance is free and voluntary. *Frequent attendance and active participation at CLC sessions will greatly increase your "Active Engagement in Class" score.*

Students who regularly attend CLC sessions weekly typically earn higher final course and exam grades than students who do not participate (typically one full letter grade higher). Please make an appointment for a CLC session each week through one of the following mechanisms:

Online: <https://csumb.edu/clc>

Phone: 831-582-4104

Email: asap@csumb.edu

Visit the CLC: Tanimura & Antle Family Memorial Library, Room 2125

Questionnaires

Weekly iLearn questionnaires are due at the end of most weeks of the course. These questionnaires are a chance for you to identify what you have learned, what you still don't know and also to give us feedback on the course. The process of evaluating what you are learning is called metacognition. The more each of us is able to accurately reflect on what we are learning and what we are not learning, the more effective we are at learning new things in life. You'll get credit for responding to these questionnaires

Course Exams/Summative Assessments

Four midterms and a final

There are five exams in Bio211, one for each broad section of material (evolution, biodiversity, ecology, and plant physiology) and one comprehensive final. Each exam will focus on that specific section of material but will build on your cumulative knowledge of the previous sections. The final exam will cover all the sections equally.

Two-part Exams

Several exams will be given using a two-stage exam model. During the exam session, there will be a longer, individual section followed by a shorter group section. We'll discuss more details in class about this format.

Format and Expectations

All exams are closed note/closed book, and without the use of any wireless devices during (see Academic Integrity Policy below). For each exam, students must bring a #2 pencil for Scantron questions, a pen for essay questions and a calculator for some calculations without your cell phone.

We retain all exams.

To continually improve Bio211 exams and more fairly assess students, we revise and reuse some of exam questions. You will have the opportunity to go over all of the answers to the questions after each exam in the Discussion section. The exams may also be reviewed in office hours.

Exam Grading

Exams are worth 73% of your final grade. Within that 73% the midterms increasing in value and the final exam is worth 19% (5% more than any of the midterms). Exams are graded on a straight scale (see grading scale on previous page). The exams are *not* be graded on a curve. In the rare situation that no student receives an A on an exam, we may scale up the scores in order that at least one student receives an A or A-. We recommend that you add up your score on the day the exams are gone over in your Discussion section. In the outside chance there has been an addition error, please bring it to the attention of your discussion leader or one of us. *You will have one week after the exams have been gone over in Discussion to petition for a grade change if you have concerns about how your exam was graded.* Please come to our office hours or make an appointment to discuss your reasoning for a grade change.

Course Grade

The entire course will be graded on a straight scale and (in theory) everyone could get As (no curve). To pass Bio211, you must have at least a *C- or better in the course and receive at least 70% on a minimum of two exams.* Students who demonstrate marked improvement on the final exam will be considered favorably when determining meeting the minimum grade. A score of C- or higher is needed for this course to count toward your degree.

Incompletes and Withdrawing from the Course

Plan to complete this course before the end of the semester. Incompletes will only be given for emergencies and extraordinary situations. In addition, the current CSU policy is that students will only be able to withdraw after 9/10 for a medical reason (with a doctor's note) or other very substantive reason. *Not doing well in a course or over extending yourself is not considered to be a substantive reason by the Chancellor of the CSU*

system. If you think you may have signed up for too many units, please talk with Suzy during the first 2 weeks of class. For information on the university's withdrawal policy, download the last link on the following web page: <http://ar.csUMB.edu/site/x4671.xml>. The key message is: determine during the first two weeks of class if you will have the time and commitment that will be required to succeed in this course this semester (by coming to talk to us if needed).

Late Policies, Attendance, Missing Assignments, and Make-Ups:

Exams: You must attend every exam on the date scheduled. *We give zero points for not showing up.* Set two alarms on those days! If you have a personal or family emergency, contact us **before** the exam to figure out how we can work it out (contact Erin for Exams 1-3 and the final, and Henrik for Exam 4). You need to send an e-mail or leave a voice mail *before* the exam starts. In the case you have contacted us before the exam, you will be able to make it up on the **Friday following the exam between 4-7 pm**. (There will be someone there to proctor the exam for you, *if* we have been notified before the scheduled exam date. Please check in with us that week to make sure an exam will be ready for you.) There are no other make-up exam times.

Missing Homework: The homework will already be scaled to allow for missing 10% of the assignments across the semester. This accommodates missed assignments for computer, family, illness or other reasons.

Missing Classes: Missing a single class session a couple of times during the semester will not seriously affect your grade. However, missing multiple classes throughout the semester will lower your "Active course involvement" grade. If you have been ill and missed more than a week of classes, please bring a doctor's note. If there is another valid reason why you have been or will be missing an extended number of classes, please bring evidence to support your reason.

Athletes: If you are an athlete and have away games during an exam week, we expect you to contact us at the beginning of the semester and we can review your entire semester's schedule. Please provide your coach's contact information and a list of your game dates during the first two weeks of the semester.

Student Veterans and Active Duty Personnel: Veterans, active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor. You will find more helpful information in the VA campus toolkit at <http://mentalhealth.va.gov/studentveteran/>

Contacting Us, E-mail, Contacting you, and IT help

- Given the large numbers of students in the class, it will be difficult for us to reply to many individual e-mails. **For answers to questions about content or course matters, please post your questions on the "BIO 211 Questions and Answers" at the top of iLearn.** Any course member can post a question and other course members can answer it. We will try to add posts if any questions or answers need clarification or revisions. If we receive an email question that should be posted to the entire class on the forum, we often will post your question there for you and answer it.
- For personal problems/issues, we recommend make an appointment to talk with us one on one. If we do not reply within 24 hours please resend your question using the same e-mail thread.
- We will regularly contact you during the semester via e-mail (often \geq twice per week usually through the "BIO 211 Questions and Answers" forum). We will also contact you via e-mail for individual or private matters. We will use your CSUMB account to contact you. Please check your CSUMB e-mail account every day.
- We always use your campus CSUMB.edu address as your e-mail address. If you regularly use a different e-mail, please set up a forward from your CSUMB account.
- If you need help logging into your accounts, go to <https://csUMB.edu/it/accounts-and-passwords> or call the HELP desk (582-HELP).

Center for Student Success (CSS)

CSUMB works to make sure that all students are succeeding in their courses. To ensure this takes place, if you are falling behind or are missing too many class sessions, I strongly encourage you to schedule an appointment with the Center for Student Success to create an Academic Success Plan and get back on track. The CSS offers services such as one-on-one support, peer mentoring, and study skills workshops. CSS is located in the Library, 3rd floor, Suite 3180, 582-3165.

Academic Integrity

Academic communities are built on a foundation of integrity and science is no exception. In fact, science moves forward in part because people share their ideas and give credit to other scientists for those ideas. Similarly, the CSUMB assumes that all faculty and students honor these standards and norms by showing integrity with their own work. This includes facilitating academic dishonesty by another student. *With this in mind, we encourage you to study collaboratively; however, we expect you to answer all online quiz questions on your own. Most importantly, all exam answers must be completed individually and all submitted materials must be your own work.*

Students found to be copying work or otherwise cheating will receive zero credit for the assignment or exam for which the work was submitted. All academic dishonesty will also be reported to the University Judicial Affairs Office. More than one instance of academic dishonesty in the course will automatically lead to a failing grade.

To dissuade cheating during exams, the following rules are in force:

- **No cell phones allowed**— and using a cell phone will be considered cheating. Parents or family caregiver must talk to me *before* an exam, otherwise please silence your cellphone and leave it in a purse or backpack against the wall away from your desk. If you are found with a cell phone or other web-enabled device on your person you may receive a zero on that exam.
- **No additional materials during exams**—You are also not allowed to have any notes, flashcards, your text, etc. outside of your pack during an exam. This includes any posted notes outside of the classroom. At the beginning of the exam get out all materials you'll need for the test: no. 2 pencils, sharpener, eraser, pens, and calculator and put all other materials away (including your textbook). You will not be allowed to leave the classroom during the exam.
- **No copies of previous exams**— You are not allowed to possess, or share copied, photographed, e-mailed or scanned copies of exams -including your own exam - outside of discussion sections or office hours. Taking photographs of exams during discussion sections is not allowed. Possession of exams (your own or others) outside of discussion section and office hours will be considered cheating and you will receive a zero on an exam as well as be written up for academic dishonesty.
- **Reporting observations of cheating/dishonesty is encouraged** - If you see another student cheating on an exam (for instance by using a phone, notes, etc.), please let the instructor know by coming up to ask a question (or raising your hand if you are comfortable doing so). We will not reveal your identity to the student who is cheating.

If you feel you have been unfairly accused of academic dishonesty, please come talk to us. The last thing I want to do is falsely accuse anyone. If we can't resolve the issue or you feel uncomfortable speaking with me directly, then please speak with the SEP Division Chair in Bldg. 53/S302 (582-4696). If the issue is still not resolved, you can meet with the Judicial Affairs Officer (582-4597) on campus (and file a formal appeal if you so choose). For more information about the campus Academic Integrity policy please see:

<http://policy.csumb.edu/site/x16011.xml#students> (and click on Academic Integrity). For more information about student conduct and responsibilities see:

<http://csumb.edu/academic/catalog/archive/fall2007/x2161.html>.

“Things Happen” Clause

Although we maintain rigorous expectations of everyone in class, we also recognize that serious issues can come up and greatly influence your ability to learn biology. Please come talk with us if such a serious issue comes up in your life. I want to work with you to help you succeed. I can also help to point you toward campus resources that may be helpful from housing to food to support for personal and family issues.

Professional Conduct

Professional behavior begins in the classroom and creates a productive learning environment. All class members share responsibility for our collective learning process and maintaining a professional demeanor. Unprofessional behavior disrupts the learning environment and is disrespectful to the instructor and your classmates/colleagues. It is essential that everyone feels welcome and comfortable discussing issues in class. So, each class participant is responsible for the following:

- Arrive to class on time, be prepared to actively participate in class and stay for the session.
- All use of laptops, tablets and phones should be related to class content such as taking notes on the provided blank lecture notes.

- Be accountable to your team mate(s) by attending regularly, working collaboratively, staying on task to finish activities within available time and equally contributing to collaborative work.
- Practice active listening with your peers and team mates, speaking one at a time and avoiding interrupting others while they are speaking.
- Respect each other's opinions. Challenge yourself to be open to views different from your own and avoid blaming or put-downs of classmates.
- Take responsibility for your own academic success; engage in active learning; provide and accept constructive feedback.

Bio 211 – Spring 2019 Schedule of Topics (Tentative)

Most readings are chapters from Sadava *et al.* “Life: The Science of Biology” **11th ed.**

****Check iLearn mini webpages every day for specific homework assignments, readings, videos, learning outcomes, etc. due the night before class.**

Week	Date	Topic(s)	Assigned Chapters
1	W 1/23	Intro to Course and Overarching Themes	
	F 1/25	Studying Life	1
2	M 1/28	Introduction to Natural Selection	Natural Selection Handout & 20.1
	W 1/30	Evolutionary Mechanisms	20.2 -20.3
	F 2/1	Evolutionary Mechanisms (cont.)	20.4 & 20.6
3	M 2/4	Phylogenies	21
	W 2/6	Speciation	22
	F 2/8	Evolution of Genes and Genomes	23
4	M 2/11	Exam 1	
	W 2/13	Biodiv 1: Prokarya & Viruses	p.2-3, 25
	F 2/15	Finish Biodiv 1 / Start Biodiv 2	25, 26
5	M 2/18	Biodiv 2: Diversity of Eukaryotes	26
	W 2/20	Biodiv 3: Intro to plants -Seedless plants	27
	F 2/22	Biodiv 4: Plants with seeds	28
6	M 2/25	Biodiv 5: Kingdom Fungi & Biodiv 6: Into to Animalia	29,30
	W 2/27	Biodiv 7: Protostome Animals	31
	F 3/1	Biodiv 8: Deuterostome Animals	32
7	M 3/4	Exam II (Up through Biodiversity)	25-32 (review 1; 20-24)
	W 3/6	Animal Behavior	52
	F 3/8	Physical Environmental and Biogeography of Life	53
8	M 3/11	Finish Biogeography/ start Population Ecology	53 & 54
	W 3/13	Population Ecology	54
	F 3/15	Species Interactions & Coevolution	55
	3/18 – 3/22	Spring Break – No Class ☺	
9	M 3/25	Finish Sp. Interactions & Community Ecology I	55 & 56
	W 3/27	Community Ecology II	56
	F 3/29	Ecosystems	57
10	M 4/1	No Class ☺	

	W 4/3	A Changing Biosphere	58
	F 4/5	Global climate Change solutions	(see iLearn)
11	M 4/8	Ecology Recap	(see iLearn)
	W 4/10	Exam III (Content through Ecology)	All chapters to date
	F 4/12	The Plant Body	33
12	M 4/15	Transport in Plants	34
	W 4/17	Transport in Plants	34
	F 4/19	Plant Nutrition	35
13	M 4/22	Plant Nutrition	35
	W 4/24	Plant Growth Regulation	36
	F 4/26	Plant Growth Regulation	36
14	M 4/29	Reproduction in Flowering Plants	37
	W 5/1	Plant Responses to Environmental Cues	38
	F 5/3	Plant Responses to Environmental Cues	38
15	M 5/6	Plant Exam	33-38
	W 5/8	Evo, Biodiv & Ecology Sections Review	All assigned chapters
	F 5/9	Plant Exam overview	All assigned chapters
16	M 5/13	Final Exam	

Two Pre/Post Questions:

1. The Haleakalā silversword is a historically rare plant that occurs naturally only on the upper slopes and rim of the dormant Haleakalā volcano on the Hawaiian island of Maui. In the early 1900s, the silversword's populations declined almost to extinction due to grazing from introduced goats and damage from human tourists. Since the 1990s, silverswords have been protected from damage by fencing and their habitat restored. As a result, their populations have increased successfully toward historical numbers. Which of the following is the most likely and accurate conclusion one can draw about the future conservation status of the Haleakalā silversword:
 - A. Because it is a rare species with a limited range, this silversword species should be permanently classified as either "endangered" or "threatened."
 - B. As long as conservation efforts continue to be successful, the silversword will be completely restored to its pre-disturbance numbers and genetic diversity.
 - C. Conservation efforts are successfully increasing the numbers of plants, but some genetic diversity probably has been lost from this population.
 - D. With continued conservation, the silverswords should be able to increase their population sizes to numbers greater than their historical numbers and even greater diversity.
 - E. Despite short-term success in increasing numbers, this species probably will go extinct within the near future due to its rarity and its external pressures.
2. In 2018, the total number of individuals in all populations of the sea otter *Enhydra lutris nereis*, is estimated at 3186 individuals. Historically, the population was hunted down to a single population of 20 individuals. Assume that species' intrinsic rate of increase (r) is 0.0357. Also assume that since protection, the population has grown **exponentially** to 2018 levels. Using this information, estimate *what year* the sea otter population likely only had 20 individuals.
 - A. 1855
 - B. 1875
 - C. 1900
 - D. 1922
 - E. 1955

Essay Question (Post only)

1. The chaparral biome grows along the California coast and is driven by the dominant weather patterns of hot, dry summer and mild, rainy winters. Because of the arid summers, wildfires and drought are relatively common and are important abiotic factors driving evolution and community structure. Many chaparral plants have evolved drought and fire-resistant traits. The manzanita is a common chaparral plant named for its small apple-shaped fruit (Fig. 1). With tough leaves, the ability to resprout from stumps and seeds that require fire to break dormancy and germinate, the manzanita is well adapted to wildfire.
 - a. Based on the information provided, provide the fullest taxonomic identification possible of the manzanita covered this semester. (1 point)
 - b. Based on your evolution and ecology knowledge, **briefly explain** the evidence for manzanitas' traits being the product of random *or* selective processes. (1 point)
 - c. Using your evolutionary knowledge and evidence from the text, **identify** and **explain** which mechanism of evolution resulted in manzanita's drought and fire-resistant traits? If you think natural selection is at work, include all the postulates *in detail* and a *therefore* statement. Define all evolution terms used. (7 points)

BIO 211L CURE Dune Lab

Dune Lab Course Based Undergraduate Research Experience CUREs

1. Email *

2. ID Number

3. 1. Introduction: States goal, question and/or hypothesis?

Check all that apply.

- States goal
- States question
- States hypothesis

4. 2. Results: Results are stated, but not interpreted; specific details such as means and standard deviations provided in just one format.

Check all that apply.

- Results stated
- Results Interpreted
- Includes Means and Standard Deviations or appropriate statistical analysis
- Figures Clearly Labeled and Referenced in Text

5. 3. Discussion: Explains results in the context of the study

Mark only one oval.

	1	2	3	4	
Minimal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exceeds Proficiency

6. 4. Overall

Mark only one oval.

	1	2	3	4	
Minimal/Novice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exceeds Proficiency

7. 5. Components

Mark only one oval per row.

	Minimal/Novice	Developing	Proficient	Exceeds Proficiency
Understood context of restoration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
basic ecology concepts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
written in a professional tone for fellow scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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19FA Lecture Exam Essay Question Assessment

Dune Lab CURE - Essay question assessment

1. Email *

2. ID Number *

3. Identifying environmental selection of plant traits: Manzanita's traits being the product of random or selective processes? *

Mark only one oval.

- "Selective"
- "Random"
- Neither Described

4. Identifying and explaining EVIDENCE supporting environmental selection of plant traits *

Mark only one oval.

- Missing identification/description of adaptive traits or selective environmental factors
- Identification/description of adaptive traits or selective environmental factors (but not both)
- Both adaptive traits and selective environmental factors are described

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Google Forms

WRITTEN COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org



The VALUE rubrics were developed by teams of faculty experts representing colleges and universities across the United States through a process that examined many existing campus rubrics and related documents for each learning outcome and incorporated additional feedback from faculty. The rubrics articulate fundamental criteria for each learning outcome, with performance descriptors demonstrating progressively more sophisticated levels of attainment. The rubrics are intended for institutional-level use in evaluating and discussing student learning, not for grading. The core expectations articulated in all 15 of the VALUE rubrics can and should be translated into the language of individual campuses, disciplines, and even courses. The utility of the VALUE rubrics is to position learning at all undergraduate levels within a basic framework of expectations such that evidence of learning can be shared nationally through a common dialog and understanding of student success.

Definition

Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Framing Language

This writing rubric is designed for use in a wide variety of educational institutions. The most clear finding to emerge from decades of research on writing assessment is that the best writing assessments are locally determined and sensitive to local context and mission. Users of this rubric should, in the end, consider making adaptations and additions that clearly link the language of the rubric to individual campus contexts.

This rubric focuses assessment on how specific written work samples or collections of work respond to specific contexts. The central question guiding the rubric is "How well does writing respond to the needs of audience(s) for the work?" In focusing on this question the rubric does not attend to other aspects of writing that are equally important: issues of writing process, writing strategies, writers' fluency with different modes of textual production or publication, or writer's growing engagement with writing and disciplinarity through the process of writing.

Evaluators using this rubric must have information about the assignments or purposes for writing guiding writers' work. Also recommended is including reflective work samples of collections of work that address such questions as: What decisions did the writer make about audience, purpose, and genre as s/he compiled the work in the portfolio? How are those choices evident in the writing -- in the content, organization and structure, reasoning, evidence, mechanical and surface conventions, and citational systems used in the writing? This will enable evaluators to have a clear sense of how writers understand the assignments and take it into consideration as they evaluate.

The first section of this rubric addresses the context and purpose for writing. A work sample or collections of work can convey the context and purpose for the writing tasks it showcases by including the writing assignments associated with work samples. But writers may also convey the context and purpose for their writing within the texts. It is important for faculty and institutions to include directions for students about how they should represent their writing contexts and purposes.

Faculty interested in the research on writing assessment that has guided our work here can consult the National Council of Teachers of English/ Council of Writing Program Administrators' White Paper on Writing Assessment (2008; www.wpacouncil.org/whitepaper) and the Conference on College Composition and Communication's Writing Assessment: A Position Statement (2008; www.ncte.org/cccc/resources/positions/123784.htm)

Glossary

The definitions that follow were developed to clarify terms and concepts used in this rubric only.

- **Content Development:** The ways in which the text explores and represents its topic in relation to its audience and purpose.
- **Context of and purpose for writing:** The context of writing is the situation surrounding a text: who is reading it? who is writing it? Under what circumstances will the text be shared or circulated? What social or political factors might affect how the text is composed or interpreted? The purpose for writing is the writer's intended effect on an audience. Writers might want to persuade or inform; they might want to report or summarize information; they might want to work through complexity or confusion; they might want to argue with other writers, or connect with other writers; they might want to convey urgency or amuse; they might write for themselves or for an assignment or to remember.
- **Disciplinary conventions:** Formal and informal rules that constitute what is seen generally as appropriate within different academic fields, e.g. introductory strategies, use of passive voice or first person point of view, expectations for thesis or hypothesis, expectations for kinds of evidence and support that are appropriate to the task at hand, use of primary and secondary sources to provide evidence and support arguments and to document critical perspectives on the topic. Writers will incorporate sources according to disciplinary and genre conventions, according to the writer's purpose for the text. Through increasingly sophisticated use of sources, writers develop an ability to differentiate between their own ideas and the ideas of others, credit and build upon work already accomplished in the field or issue they are addressing, and provide meaningful examples to readers.
- **Evidence:** Source material that is used to extend, in purposeful ways, writers' ideas in a text.
- **Genre conventions:** Formal and informal rules for particular kinds of texts and/or media that guide formatting, organization, and stylistic choices, e.g. lab reports, academic papers, poetry, webpages, or personal essays.
- **Sources:** Texts (written, oral, behavioral, visual, or other) that writers draw on as they work for a variety of purposes -- to extend, argue with, develop, define, or shape their ideas, for example.

WRITTEN COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org



Definition

Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Context of and Purpose for Writing <i>Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).</i>	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Genre and Disciplinary Conventions <i>Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).</i>	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

Methods: The requirements for the use of t-test are: Samples obtained independently from populations with normal distribution; the variable must be continuous; the distribution of both populations must be approximately equal; and the samples should be big enough (in general > 20), with approximately normal distribution. If one or more of these conditions are violated, then use of a non-parametric test is appropriate. The non-parametric options are: Wilcoxon (paired/dependent t-test) and Mann-Whitney (independent t-test) tests. As these are ordinal data, with varying populations, and not a normal distribution, the non-parametric Mann-Whitney test was selected.

Table S1: Mann-Whitney Test Results

Construct	Question	MWU	Wilcoxon W	Z	Asymp.Sig.	Exact Sig.
URSSA (Weston and Laursen, 2015) Thinking and Working like a Scientist	1	0.000	1.000	-1.225	0.221	0.667
	2	0.500	3.500	-1.225	0.221	0.333
	3	Not enough valid cases				
	4	0.000	1.000	-1.000	0.317	1.000
	5	0.000	1.000	-1.000	0.317	1.000
PITS Hanauer, Graham, & Hatfull, 2016) Self- Efficacy	1	0.500	6.500	-1.000	0.317	0.500
	2	Not enough valid cases				
	3	Not enough valid cases				
	4	3.500	13.500	-0.250	0.803	0.800
	5	4.500	7.500	-.203	0.839	0.857
PITS Hanauer, Graham, & Hatfull, 2016) Networking Ownership	1	11.500	26.500	-0.659	0.510	0.537
	2	0.500	55.500	-1.535	0.125	0.182
	3	3.000	9.000	-0.745	0.456	0.700
	4	4.500	10.500	-0.966	0.334	0.393
	5	1.000	37.000	-1.242	0.214	0.444

URSSA (Weston and Laursen, 2015) Personal Gains	1	10.000	46.000	-0.424	0.672	0.776
	2	1.000	16.000	-1.789	0.074	0.190
	3	25.500	46.500	-0.188	0.851	0.864
	4	25.500	46.500	-0.545	0.586	0.635
	5	20.000	41.000	-0.152	0.879	0.945
LCAS (Corwin et al., 2015) Discovery and Relevance	1	4.500	10.500	-0.980	0.327	0.393
	2	3.000	6.000	-0.837	0.403	0.571
	3	0.000	1.000	-1.225	0.221	0.667
	4	0.500	6.500	-1.000	0.317	0.500
	5	0.000	1.000	-1.414	0.157	0.500
URSSA (Weston and Laursen, 2015) Attitudes and Behaviors	1	Not enough valid cases				
	2	Not enough valid cases				
	3	Not enough valid cases				
	4	Not enough valid cases				
	5	Not enough valid cases				
LCAS (Corwin et al., 2015) Collaborati on	1	0.500	1.500	0.000	1.000	1.000
	2	Not enough valid cases				
	3	1.000	7.000	-0.471	0.637	1.000
	4	0.500	10.500	-1.118	0.264	0.400
	5	Not enough valid cases				

	6	2.000	5.000	0.000	1.000	1.000
PITS Hanauer, Graham, & Hatfull, 2016) Networking	1	2.000	30.000	-0.688	0.491	0.750
	2	8.000	11.000	-0.663	0.507	0.758
	3	15.000	36.000	0.000	1.000	1.000

Methods: A chi-squared test, also written as χ^2 test, is a statistical hypothesis test that is valid to perform when the test statistic is chi-squared distributed under the null hypothesis, specifically Pearson's chi-squared test and variants thereof. The chi square test of independence is used to determine if two variables are related or not. Ho: proportion construct/question responses is independent of Latinx

Ha: proportion construct/question responses is different for Latinx vs not Latinx. Compare the actual data values with what would be expected if the null hypothesis is true. The test statistic involves finding the squared difference between actual and expected data values, and dividing that difference by the expected data values. Then, compare the test statistic to a theoretical value from the chi square distribution. The theoretical value depends on both the alpha value and the degrees of freedom for the data.

Table S2: Chi-Squared Test Results

Construct	Question	X-squared	df	p-value
URSSA (Weston and Laursen, 2015) Thinking and Working like a Scientist	1	5.5259	3	0.1259
	2	6.0955	3	0.1174
	3	5.4623	3	0.1349
	4	2.1149	3	0.6187
	5	4.443	3	0.2219
PITS Hanauer, Graham, & Hatfull, 2016) Self-Efficacy	1	5.6077	3	0.1409
	2	1.9103	3	0.7521
	3	5.8876	3	0.07546
	4	3.787	3	0.2984
	5	0.75294	3	0.5582
PITS Hanauer, Graham, & Hatfull, 2016) Networking Ownership	1	2.378	3	0.3683
	2	6.381	3	0.08196
	3	5.8682	3	0.1159
	4	1.1604	3	0.958
	5	0.84617	3	0.8576
URSSA (Weston and Laursen, 2015) Personal Gains	1	3.7425	3	0.3143
	2	0.7056	3	0.8666
	3	1.4541	3	0.6962
	4	1.5421	3	0.7381
	5	1.6087	3	0.7046

LCAS (Corwin et al., 2015) Discovery and Relevance	1	2.102	3	0.5992
	2	5.4092	3	0.1609
	3	4.0802	3	0.3103
	4	1.5024	3	0.7196
	5	1.6134	3	0.6737
URSSA (Weston and Laursen, 2015) Attitudes and Behaviors	1	4.5645	3	0.1569
	2	1.5737	3	0.6782
	3	2.7554	3	0.4083
	4	0.49618	3	0.9085
	5	1.325	3	0.5837
LCAS (Corwin et al., 2015) Collaboration	1	5.922	3	0.1874
	2	1.2372	3	0.9545
	3	6.3134	3	0.1404
	4	4.4745	3	0.2179
	5	3.011	3	0.3783
	6	3.2914	3	0.4033
PITS Hanauer, Graham, & Hatfull, 2016) Networking	1	2.0692	3	0.5752
	2	2.2166	3	0.5432
	3	2.4957	3	0.5142