California State University Fullerton
Department of Biological Science

Undergraduate Advising Handbook

Catalog Year FALL 2024

Quick Reference

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CSUF | Biological Science
COLLEGE OF NATURAL SCIENCES AND MATHEMATICS

800 N. State College Blvd., Fullerton, CA 92831 | McCarthy Hall 205
Tel: 657-278-3614 | Web: https://www.fullerton.edu/biology

Welcome to the Department of Biological Science at Cal State Fullerton! A Biology degree opens doors to many exciting careers and life experiences. You have likely chosen Biology as a major because of a strong interest in science and pursuing a biology-related career in biotechnology, environmental management and conservation, research, forensics, teaching, journalism, law or government or continuing to a health professions program or graduate school.

Biology is a challenging major, but your enthusiasm for science and your commitment to your long-term goals will see you through. Persistence is the key, and we will help you every step of the way toward graduation. The faculty and staff in the Department of Biological Science are dedicated to your success! Please let us know how we can help.

Success as a Biology Major ultimately depends on the choices you make. Your time in your classes and studying will take time and effort. There are many resources available that will help you be successful. Cal State Fullerton offers a wealth of resources that are available to you. You can find free academic support through Supplemental Instruction and at the Student Success Center for Natural Sciences and Mathematics and the Writing Center. Support can be found at a wide variety of campus Resource Centers (www.fullerton.edu/sa/ and www.fullerton.edu/dirc/), including health and well-being (ASI Food Pantry, Tuffy's Basic Needs, Disability Support Services, YOU@ Fullerton, and Health Services). In addition, there are resources available to help you explore your career options through the Career Center and the Center for Internships & Community Engagement. Most important, choose to become involved with the campus through clubs and organizations. Joining student organizations, volunteering, and participating in undergraduate research with a faculty mentor or as a member of a research program are all great ways to form supportive connections with the campus, the department, and your fellow students.
This handbook is intended to help you plan and navigate the requirements for your bachelor's degree in Biological Science. Please review its contents from the first page to the last page. You can find information on your degree requirements, the biology concentrations, planning your classes, faculty research interests, scholarships, and more.

The Department of Biological Science provides academic advising to help you make progress towards graduation. We offer group advising during the semesters you are taking lower division biology core courses and one-on-one advising with a faculty advisor as you transition to your upper division electives. If you need additional assistance at any time, please stop by the Department office (McCarthy Hall 205) or email bioladvising@fullerton.edu and ask for help.

We look forward to meeting and working with you.

Sincerely,

Marcelo E. Tolmasky, Ph.D.
Professor and Chair
Department of Biological Science

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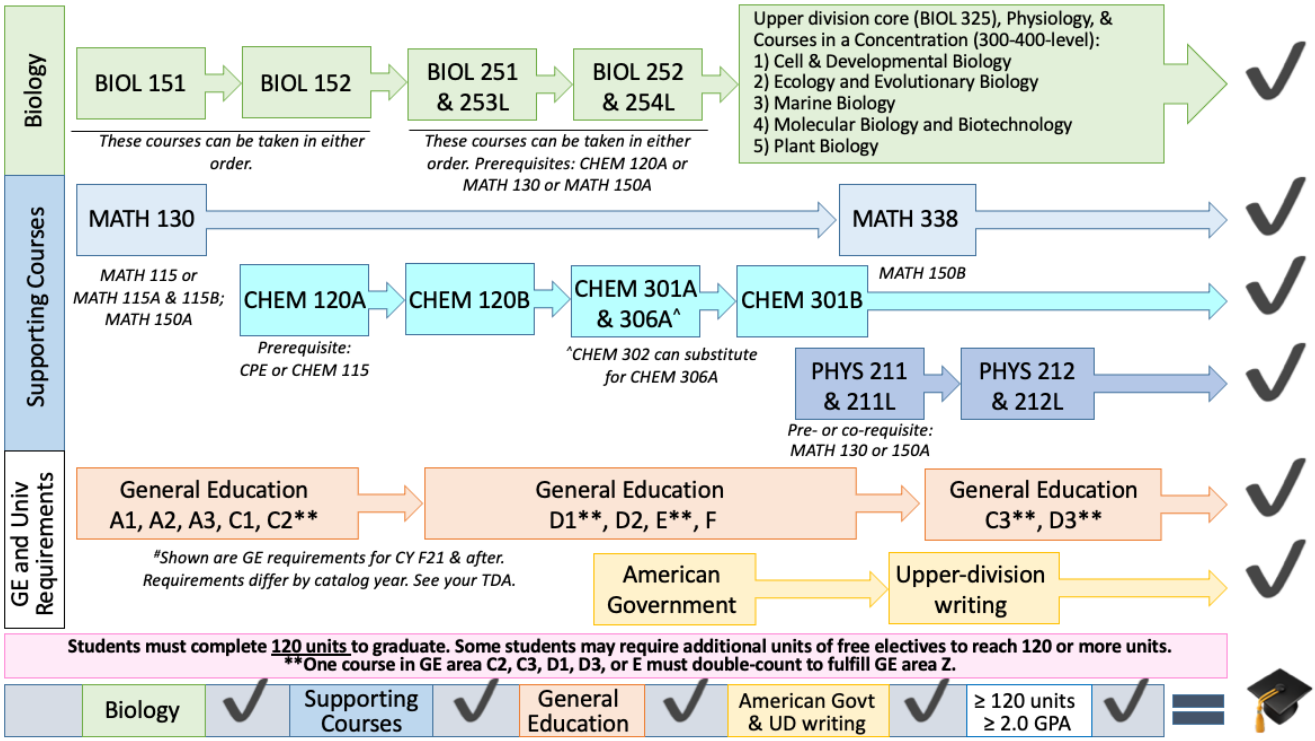
BACHELOR OF SCIENCE DEGREE IN BIOLOGY: OVERVIEW

Catalog Year FALL 2024



- ☐ Declare your concentration during the semester you are taking your last lower-division Biology Core course.
- ☐ Complete 40 units of Biology major courses (Biology Core courses and upper-division courses to fulfill a concentration) with a grade of C or higher in each course; overall Biology GPA ≥ 2.0
- ☐ Complete Supporting Courses (MATH, CHEM, PHYS) with a grade of C or higher in each course.
- ☐ Complete General Education requirements (for more information, visit: https://catalog.fullerton.edu/content.php?catoid=91&navoid=13359)
- ☐ Complete Upper-Division Writing Requirement
- ☐ Apply for Graduation one-year (i.e., two semesters) before your anticipated graduation date.

BACHELOR'S DEGREE: REQUIREMENTS

Use your Titan Degree Audit (TDA) to track your progress toward completion of your degree.

A. Major requirements (minimum grade of C required in each course):

1. 40 units of Biology courses, including:
    - The Biology Core courses (BIOL 151, 152, 251, 253L, 252, 254L, 325)
    - At least 21 units of upper-division Biology electives fulfilling a concentration (excludes Biology courses in GE Area B.5)
    - 5 of the 21 units of upper-division Biology must be laboratory/fieldwork
    - Minimum GPA of 2.0 in all attempted Biology courses
2. 34 units of supporting courses, including:
    - MATH 130, 338 or MATH 150A, 150B
    - PHYS 211, 211L, 212, 212L
    - CHEM 120A, 120B, 301A, 306A, 301B

B. University requirements:

1. Students must complete a total of 120 units for the Bachelor of Science
    - CSUF GPA and Cumulative GPA must be 2.0 or higher
    - At least 40 units must be upper-division (300-400 level) coursework. Completion of major requirements and upper-division GE requirements, usually fulfills the 40-unit requirement. Note: Organic Chemistry at CSUF is upper-division coursework. If taken at a community college (lower-division), additional upper-division units may be required to reach the 40-unit upper-division coursework requirement.
    - Complete at least 30 units in "residence" at CSUF
        - At least 24 of the 30 units must be upper-division
        - At least 12 of the 24 upper-division units must be of the major
    - General education requirements (at least 48-49 GE units), including:
        - At least 9 units of upper-division GE (300-400 level) courses: B5, C3, D3
        - At least 3 units of Cultural Diversity (Z) courses: C, D, or E that overlays with Z
        - 3 units in Area F
        - An American Government course (POSC 100 or HONR 201B) is required for catalog year 2021 and after
    - Satisfy 3 units of CSUF upper-division writing requirement (ENGL 301, 363, BIOL 398, or BIOL 498)

2. Special unit totals; no more than:
    - 70 units transferred from a community college
    - 90 units from a 4-year university
    - 30 units from credit by examination
    - 36 credit/no credit units
    - 24 units taken through Extended Education
    - 6 units of internship (495 courses in any department)
    - 9 units from independent study courses
    - 3 units from tutorial courses

C. Apply for graduation:

1. Apply for graduation one year (i.e., two semesters) prior to anticipated graduation date, but only after completing all lower-division (100-200 level) Biology courses and declaring your concentration. The Department of Biological Science with then review your requirements for graduation.
    - Log into the student portal and access the Student Homepage in Titan Online
    - Click on the Academic Records tile
    - Select Academic Summary
    - Click Extend Grad Term to Future Semester to update your graduation term (you will see your current Expected Grad Term based on when you were started/transferred at CSUF and Graduation Status)
    - Click on the drop-down menu to select the Extended or New Graduation Term you want, then Save
    - Click OK to confirm your graduation term was successfully changed
2. Carefully select your graduation term. Choosing the incorrect term can have negative consequences on advising, enrollment, and financial aid. Discuss your graduation term with an advisor.
3. To advance to "Candidate" status, your grad check must be approved by the Department of Biological Science.
4. Pay the $115 CSUF graduation fee during your graduating semester.

UNDERSTANDING YOUR CATALOG YEAR

What is my catalog year and why is it important?

The CSU and CSUF occasionally modify graduation requirements. If you have been in continuous attendance, you may choose to meet the CSUF campus graduation requirements in the CSUF catalog that was in effect in any of the three following instances:

1. At the time you began continuous attendance at CSUF, *OR* if you are an upper-division transfer student, at the time you began continuous attendance at the California Community College,
2. At the time you transferred to the CSU campus, or
3. At the time you graduate from the CSU campus.

By maintaining continuous attendance and selecting option 1 or 2, you can be assured that your CSU campus graduation requirements will not change. Your right to choose one of these options is called "catalog rights".

For example: If you are a new, first-time freshman in the fall of 2024, then your assigned catalog year is 2024 (2024-2025). If you are a new transfer student in the fall of 2024 and were continuously enrolled in community college since fall 2022 or spring 2023, then your appropriate catalog year is 2022 (2022-2023) or 2024 (2024-2025).

May I choose a catalog year other than what I was assigned when I first enrolled at CSUF?

Yes, as long as it aligns with one of the three circumstances above. Normally, it is in your best interest to commit to the catalog year, that is, the General Education, major and minor requirements, that were in effect when you first enrolled at CSUF or when you first began uninterrupted enrollment at a community college on your pathway to transferring to CSUF. This is because that is the catalog that holds the requirements that you anticipated at the time you prepared to apply for admission.

Your catalog year's requirements come as a package. For example, you may not elect to fulfill the major requirements of one year's catalog and the General Education requirements of a different year.

To learn more, visit the CSUF catalog year website: https://www.fullerton.edu/general-education/student-info/catalog-year.html

To search for courses by your catalog year, visit: https://www.fullerton.edu/general-education/student-info/approved-courses.html

How do I know what catalog year I was assigned?

Look at your Titan Degree Audit (TDA) on the upper right-hand side to see your catalog year.

BACHELOR OF SCIENCE
BIOLOGICAL SCIENCE

Program Code	BS BSCI	**Catalog Year**	FA 2023
Graduation Date	UNKNOWN	**Job ID**	241300043157025 3

PLANNING YOUR COURSEWORK

Many CSUF students work and/or have family commitments, long commutes to CSUF, as well as other important obligations that can take up their time. To be successful as a biology major, we recommend the following based on a 60-hour work week (school + commitments) and the need to study 25-35 hours per week. Keep in mind that lecture classes generally meet for 3 hours per week and labs meet for 3-6 hours per week (3 hours per unit of lab; biology core course labs meet for 3 hours per week, and some upper-division biology courses have 2 units of lab that meet for 6 hours per week). Every week, you should create time in your schedule to allow you to study 3 hours for every unit of lecture and 2 hours for every unit of lab. Demands on your time will vary over the semester. Time management is a critical skill for success.

Hours (work, family, commute) per week	**Max. number of units per semester**
0-9	14-16
10-19	13-14
20-29	9-12
30-39	6-9

Planning time to graduation

At CSUF, a bachelor's degree requires 120 units of coursework…

If you complete (i.e., take and pass): *You will graduate in:*

30 units/year……4 years
24 units/year……5 years
20 units/year……6 years

To reach your goal for graduation, you will need to balance your time, your course load, and make a plan indicating how much you need to work, how much time you need to be successful in your courses (for most students, this means getting A's and B's; not C's), and the consequences of how you arrange your schedule (i.e., it is generally not a good idea to take calculus, chemistry, physics, biology, and history in a single semester).

CSUF REPEAT POLICY & WITHDRAWL POLICY

Students can check their "Repeated" or "W" units at CSUF by choosing "Withdrawls/Repeats" in the dropdown menu of the Student Center in Titan Online.

CSUF Repeat Policy

- A student can repeat a *maximum of 16 units at CSUF for their entire CSUF record* with "***Grade Forgiveness***". Grade forgiveness means that the GPA calculation is adjusted to remove the effect of the initial grade, and the GPA will include only the repeated grade but BOTH grades remain listed on transcripts. Grade forgiveness is applied to the first 16 units that a student repeats at CSUF. This includes transferred courses that are eligible for grade forgiveness as well.
- A student can repeat a *maximum of 12 units at CSUF for their entire CSUF record* with "***Grades Averaged***". Grades averaged means that the GPA calculation includes the grades of both the initial attempt and the repeat of the class but BOTH grades remain listed on transcripts. This includes transferred courses that are eligible for grade averaging as well.
- A *single class may be taken a maximum of 3 times*. Does not apply to classes noted in the University Catalog "may be repeated for credit".
- The "Repeat Policy" is applied automatically at the end of each term.
- Petitions to exceed the repeated units limits can be filed with the Admissions and Records Office, but are rarely granted. For example, petitions to repeat a course are denied if the equivalent course can be taken at the community college. For NSM, students must have a letter of support from the Department Chair.
- Detailed FAQs on the CSUF Repeat Policy can be found at: https://records.fullerton.edu/academics/faqs/undergraduate-repeat-policy.php

CSUF Withdrawal Policy

- An undergraduate student can have a *maximum of 18 "W" (withdrawal) units at CSUF for their entire CSUF record*. This includes transferred courses that were withdrawn from as well.
    - During the first 2 weeks of class, drop via Titan Online (no "W" on transcript); after 2 weeks, a "Request for Withdrawal" form (from Admissions and Records) must be signed by instructor and Department to withdraw with a "W" that will show on transcript.
    - After 2 weeks and prior to the last 3 weeks of instruction, withdrawals with a "W" are possible only for documented serious and compelling reasons. Requests to withdraw may be non-medical or medical in nature. For more information, go to: https://records.fullerton.edu/registration/withdraw-a-class.php. These withdrawals will show on transcript.
    - Petitions for Retroactive Withdrawals can only be filed for courses with WU (Withdrawal Unauthorized), I (Incomplete), IC (Incomplete Charged), and NC (No Credit) grades.
- Detailed information on withdrawals can be found in the registration guide for the semester in which are enrolled on the Admissions and Records website: https://records.fullerton.edu/registration/registrationguides.php

ACADEMIC NOTICE & DISQUALIFICATION

- Undergraduate students are placed on *Academic Notice* when their Cumulative GPA (GPA for all college work attempted including transferred courses) falls *below 2.0 (a "C" average)*.
- Biology majors on Academic Notice have a *CNSM Hold* placed by the College of Natural Sciences and Mathematics (CNSM) and must be advised by a member of the CNSM Student Success Team to release this hold (see this handbook for contact information). The CNSM Academic Notice Hold is SEPARATE from the *Department of Biological Science Advising Hold*.
- For more information, visit: https://www.fullerton.edu/academic-advising/tools-resources/academic-notice.html
- Undergraduates on Academic Notice are subject to disqualification if their cumulative GPA falls below the following levels:

Class Level	Units	GPA Level
Seniors	90+	1.95
Juniors	60-89	1.85
Sophomores	30-59	1.7
Freshmen	0-29	1.5

For example, if you are a junior on Academic Notice (60-89 units) and your GPA falls below 1.85 at the end of the semester, you will be dismissed from the university.

- Online resources for students on Academic Notice and disqualification:
  - Academic Notice and Disqualification tutorials can be found at: https://www.fullerton.edu/academic-advising/tools-resources/academic-notice.html
  - GPA calculator to help you determine your GPA (before and after grade forgiveness): https://www.fullerton.edu/academic-advising/tools-resources/gpa-calculator.html
- Tutoring and other campus resources are listed in this handbook.
- Students with an Academic Notice Hold from CNSM must meet with one of the advisors from the CNSM Student Success Team (see this handbook for SST website and contact information) to release their hold.

GENERAL EDUCATION INFORMATION

Why do I have to take GEs when they have nothing to do with my major?
At Cal State Fullerton, we believe that general education (GE) is the foundation of a university education, providing students with core skills that will not only benefit them in their specialties, but also serve them well as they advance in their career.

The General Education Program at CSUF is designed to give students a breadth of knowledge and understanding across the major disciplines of science, social science, arts, and humanities, while also helping them develop skills such as critical thinking and writing, enhance their capacity for lifelong learning, and strengthen their ability to contribute effectively within our culturally diverse society.

For more information on GE requirements, visit the GE website: https://www.fullerton.edu/general-education/

To view GE requirements for catalog year fall 2024, visit: https://www.fullerton.edu/general-education/student-info/requirements.html

INSTRUCTIONS FOR COMPLETING THE BIOLOGY BACHELOR OF SCIENCE DEGREE

1. Attend Biology major advising each semester to plan and review your academic progress
2. Visit the College of Natural Sciences and Mathematics Student Success Center and with the Advising Team. The Success Center is located in McCarthy Hall (MH) room 488 and advising is in MH room 129. To find your Student Success Center Team advisor, visit: https://www.fullerton.edu/nsmssc/advising/
3. All Biology and Supporting Courses must be completed with a grade of C or higher.
4. Complete GE Courses.
5. Declare your concentration during the semester you are taking your last lower-division biology core course.
6. Apply for graduation two semesters before you plan to graduate (e.g., if you plan to graduate spring 2027, you should apply for graduation early spring semester of 2026). It is recommended that you apply for graduation early in the semester to receive your biology grad check for advising of your last two semesters.

To find

BIOLOGY CORE & SUPPORTING COURSES WORKSHEET

CATALOG YEAR FA2018 AND LATER

Required Biology Core Courses must be passed with a C or better (19 units):

Course Number	Course Title (units)	Semester Taken	Grade
BIOL 151	Cellular and Molecular Biology (4)		
BIOL 152	Evolution and Organismal Biology (4)		
BIOL 251	Genetics (3)		
BIOL 253L	Cell/Molecular Skills Lab (1)		
BIOL 252	Principles of Ecology (3)		
BIOL 254L	Research Skills for Ecology/Organismal Biology (1)		
BIOL 325	Principles of Evolution (3)		

>> After completion of the 19 units of Biology Core Courses, 21 units (including 5 units of lab/field) of upper-division Biology Electives in a concentration of your choice must be taken to reach a total of 40 units of Biology courses.

Required Supporting Courses must be passed with a C or better (34 units):

Course Number	Course Title (units)	Semester Taken	Grade
MATH 130 (or MATH 150A)	Calculus for the Natural Sciences (or Calculus I) (4)		
MATH 338 (or MATH 150B)	Statistics Applied to Natural Sciences (or Calculus II) (4)		
CHEM 120A	General Chemistry (5)		
CHEM 120B	General Chemistry (5)		
CHEM 301A	Organic Chemistry (3)		
CHEM 301B	Organic Chemistry (3)		
CHEM 306A	Organic Chemistry Lab (3)		
PHYS 211	Elementary Physics (3)		
PHYS 211L	Elementary Physics Lab (1)		
PHYS 212	Elementary Physics (3)		
PHYS 212L	Elementary Physics Lab (1)		

Required CSUF Upper-Division Writing Course must be passed with a C or better (3 units):

Course Number & Title (units)	Semester Taken	Grade
ENG 301: Advanced College Writing (3) ***OR***		
ENGL 363: Scientific Writing (3) ***OR***		
BIOL 398: Scientific Communication Workshop (3) ***OR***		
BIOL 498: Senior Thesis (3)		

BIOLOGY CORE & SUPPORTING COURSES PREREQUISITES

CO-REQUISITES NOTED IN PARENTHESIS

Course Number	**Prerequisites**
BIOL 151	None
BIOL 152	None
BIOL 251	BIOL 151 & 152 AND CHEM 120A OR MATH 130/150A; BIOL 251 (co-requisite)
BIOL 253L	BIOL 251 (co-requisite)
BIOL 252	BIOL 151 & 152 AND CHEM 120A OR MATH 130/150A; BIOL 252 (co-requisite)
BIOL 254L	BIOL 252 (co-requisite)
BIOL 325	BIOL 251/253L & 252/254L
MATH 130 (or MATH 150A)	Passing score on ALEKS, MQE, or exemption
MATH 338 (or MATH 150B)	MATH 130 OR MATH 150B (or MATH 150A for MATH 150B) or consent of instructor
CHEM 120A	Passing score on CPE or CHEM 115
CHEM 120B	CHEM 120A
CHEM 301A	CHEM 120A & 120B; CHEM 306A (co-requisite)
CHEM 301B	CHEM 301A
CHEM 306A	CHEM 120B; CHEM 301A (co-requisite)
PHYS 211	MATH 125 OR MATH 130 OR MATH 150A; PHYS 211L (co-requisite)
PHYS 211L	PHYS 211 (co-requisite)
PHYS 212	PHYS 211; PHYS 212L (co-requisite)
PHYS 212L	PHYS 212 (co-requisite)

BIOLOGY UPPER-DIVISION BIOLOGY MAJORS ELECTIVES

300-400 LEVEL COURSES

BIOL	Course Title (units)	Units	Offered	Prerequisites
302	General Microbiology	3	FA, SP	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B; *BIOL 302L* (corequisite)
302L	General Microbiology Lab	2/2	FA, SP	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B; *BIOL 302* (corequisite)
303	Intermediate Cell Biology	3	FA, SP, SU	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B
309	Intermediate Molecular Biology	3	F, S, SU	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B
317	Field Marine Biology	4/2	SP	BIOL 251/253L *AND* BIOL 252/254L
329	Essential Techniques in Cell Biology	3/2	SU	BSCR Scholars only; *BIOL 302, BIOL 302L AND BIOL 303 OR 309*
332	Biology of Vertebrates	3	FA	BIOL 251/253L *AND* BIOL 252/254L
340	Field Botany	3/2	SP EVEN	BIOL 251/253L *AND* BIOL 252/254L
345	Plant Biology	3/1	FA	BIOL 251/253L *AND* BIOL 252/254L
361	Human Anatomy	4/2	FA, SP	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B
362	General Human Physiology	4/1	FA, SP	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B
398	Scientific Communication Workshop	3	P	
400	Seminar in Biology Education	3	FA	BIOL 325, *302, 303 OR 309*
401	Biogeography	3	FA EVEN	BIOL 325
402	Computer Lab in Molecular Systematics	3/1	FA ODD	BIOL 325, 303 OR 309
405	Developmental Biology	3	SP	*BIOL 303 OR 309*
410	Evolutionary Genetics	4/2	FA	BIOL 251/253L *AND* BIOL 252/253L
411	Medical Genetics	3	SU	*BIOL 302 or 309, or CHEM 421 or 423A*
412	Principles of Gene Manipulation	3	FA	*BIOL 309 AND CHEM 301B OR CHEM 423A*
413	Advances in Molecular Genetics	3	SP	*BIOL 309 AND CHEM 301B OR CHEM 423A*
414	Microbial Genetics	3	WI	*BIOL 302, 302L, 309, CHEM 421 OR 423A*
417	Advances in Cell Biology	3	FA, SP	*BIOL 303*
418L	Advances in Cell Biology Lab	2/2	P	BIOL 303
419	Marine Ecology	3	FA ODD	BIOL 325
419L	Marine Ecology Lab	1/1	FA ODD	*BIOL 419 co-requisite*
422	Coastal Ecology	4/2	FA EVEN	BIOL 325
424	Immunology	5/2	SP	*BIOL 302, BIOL 302L AND BIOL 303 OR 309*
426	Molecular Virology	3	SP	*BIOL 302, 303, 309 OR CHEM 421*
427	Stem Cell Biology	3	FA, SP	*BIOL 303 OR 309*. Recommended: BIOL 405 or 424
428	Biology of Cancer	3	FA, SU	*BIOL 303 OR 309 OR* 325. Recommended: BIOL 424
429	Techniques in Stem Cell Biology	3/2	FA	*BIOL 302, 302L AND BIOL 303 OR 309*
430	Advances in Microbiology	3	FA, SP	*BIOL 302 AND 302L*
431	Advanced Microbiology Lab	3/2	FA	*BIOL 302*
436	Advanced Applied Statistics	4		MATH 338
438	Public Health Microbiology	4/2	FA, SP	*BIOL 302 AND 302L*
441	Plant Taxonomy	4/2	SP ODD	BIOL 325, *340, 344 OR 345*
443	Plant Ecology	4/2	SP EVEN	BIOL 325 *OR 345*
444	Plant Physiological Ecology	4/2	SP ODD	BIOL 251/253L *AND* BIOL 252/254L
445	Plant Cell Physiology	3	FA EVEN	BIOL 325, *302, 302L, 309, 345, CHEM 421 OR 423A*
446	Marine Phycology	4/2	FA ODD	BIOL 251/253L *AND* BIOL 252/254L
448	Plant Molecular Biology	4/2	FA ODD	*BIOL 302, 303, 309, CHEM 421 OR 423A*
449	Desert Ecology	4/2	SP ODD	BIOL 325
450	Conservation Biology	3	SP	BIOL 325
452	Global Change Biology	4/1	FA	BIOL 325
454L	Microscopy and Imaging in Biology	2/2	SP	BIOL 325, *302, 303 OR 309*

BIOL	Course Title (units)	Units	Offered	Prerequisites
461	Marine Invertebrate Biology	4/2	FA EVEN	BIOL 251/253L *AND* BIOL 252/254L
462	General Parasitology	4/2	FA	*BIOL 302 AND 302L*
465	Integrative Biology of Spider Silk	3	SP ODD	*BIOL 303, 309, or 325*
466	Behavioral Ecology	3	FA ODD	BIOL 251/253L *AND* BIOL 252/254L
468	Comparative Animal Physiology	4/1	P	BIOL 251/253L *AND* BIOL 252/254L *AND* CHEM 120B
470	Cellular Neurology	3	P	*BIOL 303 OR 309*
472A	Advances in Biotechnology Lab (CHEM 472A)	3/2	FA	*BIOL 302, 302L AND BIOL 309 OR CHEM 421 OR CHEM 423A*; BIOL 412 corequisite
472B	Advances in Biotechnology Lab (CHEM 472B)	3/2	SP #	*CHEM 421 OR 423A AND* consent of instructor
473	Bioinformatics (CHEM 473)	3/1	SP	*BIOL 325, 302, 302L, 303, CHEM 421 OR 423A*
475	Ichthyology	4/2	SP ODD	BIOL 251/253L *AND* BIOL 252/254L
476	Herpetology	4/2	SP EVEN	BIOL 251/253L *AND* BIOL 252/254L
478	Mammalogy	4/2	FA EVEN	BIOL 251/253L *AND* BIOL 252/254L
479	Ornithology	4/2	SP ODD	BIOL 251/253L *AND* BIOL 252/254L
480*	Advanced Topics in Undergrad Biology	1-3	FA, SP	Consent of instructor
480C*	Stem Cell Proseminar	2	FA	BSCR Scholars only; *BIOL 329*
480D*	Colloquium: Diverse Topics in Biology	1	FA, SP	Pre- OR corequisite of a 300-400 level Biology course
480P*	COMPASS Proseminar	1	FA, SP	COMPASS Scholars only
480U*	Undergraduate Research Enhancement Proseminar	1	FA, SP	U-RISE Scholars only
481	Advances in Evolution and Ecology	3	SP EVEN	BIOL 325
482*	Capstone Studies in Biology (Study Abroad)	2/2	WI	≥ 90 units completed; Consent of instructor
483	Evolutionary Genomics and Aging	3	P	BIOL 325
490T	Clinical Microbiology (Study Abroad)	3/2	WI	Consent of instructor
495	Biological Internship	3/2	FA, SP, SU	≥ 90 units completed including BIOL 325, *302, 302L, 303, 309 OR 317, OR 345*; Consent of instructor
498*	Senior Thesis	1-3	FA, SP	BIOL 499L corequisite; Consent of instructor
499L*	Independent Laboratory Study	1-3	FA, SP	Junior OR Senior standing; Consent of instructor
CHEM 421**	Biological Chemistry (for Biology majors)	3	FA, SP #	CHEM 301B
CHEM 423A**	General Biochemistry (for Biochemistry majors)	3	FA, SP #	CHEM 301B; CHEM 315 corequisite
GEOG 313	Natural Vegetation	3	SP	

Units listed are shown as the total number of units for the course/lab, field
Offered when the course is *usually* offered; FA = fall, WI = winter session, SP = spring, SU = summer session, P = periodic, EVEN/ODD = year
***** No more than a combined total of six units of BIOL 480 (3 units maximum), BIOL 482 (2 units maximum), BIOL 498 (3 units maximum) and BIOL 499L (6 units maximum) shall be counted toward requirements for the major. No more than three units of BIOL 499L may count toward the upper-division biology laboratory/field requirements.
****** A maximum of 3 units may be counted toward requirements for the major.
See Chemistry course offerings

Non-Biology Majors Courses: If you are a biology major, DO NOT take the following biology courses! These courses DO NOT count towards the biology major: BIOL 101 (Elements of Biology); BIOL 101L (Elements of Biology Lab); BIOL 102 (Biology of Future Teachers); BIOL 103 (Biology of Disease); BIOL 133 (Explore Core: Truth); BIOL 191A (Integrated Human Anatomy and Physiology A); BIOL 191B (Integrated Human Anatomy and Physiology B); BIOL

202 (Microbiology for Nursing and Allied Health Professionals); BIOL 210 (Human Anatomy and Physiology); BIOL 300 (Environmental Biology and Sustainability); BIOL 304 (21st Century Virology); BIOL 305 (Human Heredity and Development); BIOL 306 (Biology of Aging); BIOL 310 (Human Physiology); BIOL 310L (Human Physiology Lab); BIOL 311/CHEM 311 (Nutrition and Disease); BIOL 318 (Wildlife Conservation); BIOL 319 (Marine Biology); BIOL 322/ANTH 322 (Human Behavioral Ecology; BIOL 327 (Stem Cells and Regenerative Medicine); BIOL 330 (Sustainability Ecology American Indian Models); BIOL 352 (Plants and Life); BIOL 360 (Biology of Human Sexuality); BIOL 453 (Life Science Concepts); BIOL 496 (Biology Tutorials).

CONCENTRATION IN CELL AND DEVELOPMENTAL BIOLOGY

The Biology major is for students who are preparing to: 1) enter biology graduate and health professional schools, 2) seek biology-related careers in industry or government agencies, or 3) teach in secondary (grades 7-12) school.

	TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
COURSE 1	BIOL 151 (GE B2 & B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 303 3 units	BIOL 325 3 units	Upper-Division BIOL Elective 3-4 units	BIOL Capstone 2-3 units
COURSE 2	CNSM 101 (GE A3) 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	BIOL 302 3 units & BIOL 302L 2 units	Upper-Division BIOL Elective 3 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective 3-4 units
COURSE 3	MATH 130 or MATH 15B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units		
COURSE 4	GE A1 or A2 3 units	GA A1 or A2 3 units	GE D1/Z** 3 units	CHEM 306A 2 units	Upper-Division Writing 3 units	PHYS 211 3 units & PHYS 211L 1 unit	PHYS 212 3 units & PHYS 212L 1 unit	
COURSE 5	GE C1 or C2** 3 units	GE C1 or C2** 3 units	GE D2 3 units	GE F 3 units		GE E* 3 units	GE C3*/Z 3 units	D3*/Z 3 units
COURSE 6				American Government 3 units				Electives to complete 120 units
Units	**17 units**	**15 units**	**15 units**	**15 units**	**14 units**	**17 units**	**13-15 units**	**12-14 units**

Cell and Developmental Biology Required Courses (8 units)

Course Number	Course Title (units)
BIOL 302	General Microbiology (3)
BIOL 302L	General Microbiology Lab (2/2)
BIOL 303	Intermediate Cell Biology (3)

Requirements continue on next page….

Cell and Developmental Biology Elective Courses (5 units)

Course Number	Course Title (units)
BIOL 329	Essential Techniques in Cell Biology (3/2)
BIOL 362	General Human Physiology (4/1)
BIOL 405	Developmental Biology (3)
BIOL 410	Evolutionary genetics (4/2)
BIOL 417	Advances in Cell Biology (3)
BIOL 418L	Advances in Cell Biology Lab (2/2)
BIOL 424	Immunology (5/2)
BIOL 427	Stem Cell Biology (3)
BIOL 428	Biology of Cancer (3)
BIOL 429	Techniques in Stem Cell Biology (3/2)
BIOL 431	Advanced Microbiology Lab (3/2)
BIOL 438	Public Health Microbiology (4/2)
BIOL 445	Plant Cell Physiology (3)
BIOL 454L	Microscopy and Imaging in Biology (2/2)
BIOL 462	General Parasitology (4/2)
BIOL 470	Cellular Neurology (3)
BIOL 490T	Clinical Microbiology (3/2)

Cell and Developmental Biology Capstone Courses (2 units)

Course Number	Course Title (units)
BIOL 400	Seminar in Biology Education (3)
BIOL 424	Immunology (5/2)
BIOL 427	Stem Cell Biology (3)
BIOL 428	Biology of Cancer (3)
BIOL 429	Techniques in Stem Cell Biology (3/2)
BIOL 431	Advanced Microbiology Lab (3/2)
BIOL 438	Public Health Microbiology (4/2)
BIOL 462	General Parasitology (4/2)
BIOL 470	Cellular Neurology (3)
BIOL 482	Capstone Studies in Biology (2/2)
BIOL 490T	Clinical Microbiology (3/2)
BIOL 498	Senior Thesis (1-3)
BIOL 499L	Independent Laboratory Study (1-3)

Other Requirements:

- Physiology course; one of the following: BIOL 302 (General Microbiology), BIOL 362 (General Human Physiology), BIOL 444 (Plant Physiological Ecology), BIOL 445 (Plant Cell Physiology), BIOL 468 (Comparative Animal Physiology)
- 5 units of laboratory/field courses; 3 units must be taken within concentration-specific courses
- 6 units of 400-level biology courses

CONCENTRATION IN ECOLOGY AND EVOLUTIONARY BIOLOGY

The Biology major is for students who are preparing to: 1) enter biology graduate and health professional schools, 2) seek biology-related careers in industry or government agencies, or 3) teach in secondary (grades 7-12) school.

	TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
COURSE 1	BIOL 151 (GE B2 & B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 325 3 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective 3-4 units	BIOL Capstone 2-3 units
COURSE 2	CNSM 101 (GE A3) 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective 3 units	Upper-Division BIOL Elective 3 units	Upper-Division BIOL Elective complete required units
COURSE 3	MATH 130 or MATH 15B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units		
COURSE 4	GE A1 or A2 3 units	GA A1 or A2 3 units	GE D1/Z** 3 units	CHEM 306A 2 units	Upper-Division Writing 3 units	PHYS 211 3 units & PHYS 211L 1 unit	PHYS 212 3 units & PHYS 212L 1 unit	
COURSE 5	GE C1 or C2** 3 units	GE C1 or C2** 3 units	GE D2 3 units	GE F 3 units		GE E* 3 units	GE C3*/Z 3 units	D3*/Z 3 units
COURSE 6				American Government 3 units				Electives to complete 120 units
Units	**17 units**	**15 units**	**15 units**	**15 units**	**15-16 units**	**14-15 units**	**13-15 units**	**12-14 units**

Requirements continue on next page….

Ecology and Evolutionary Biology Organismal Courses (3-4 units)

Course Number	Course Title (units)
BIOL 317	Field Marine Biology (4/2)
BIOL 332	Biology of Vertebrates (3)
BIOL 340	Field Botany (3/2)
BIOL 345	Plant Biology (3/1)
BIOL 441	Plant Taxonomy (4/2)
BIOL 446	Marine Phycology
BIOL 461	Marine Invertebrate Biology (4/2)
BIOL 475	Ichthyology (4/2)
BIOL 476	Herpetology (4/2)
BIOL 478	Mammalogy (4/2)
BIOL 479	Ornithology (4/2)

Ecology and Evolutionary Biology Ecology Courses (3-4 units)

Course Number	Course Title (units)
BIOL 410	Evolutionary Genetics (4/2)
BIOL 419 & 419L	Marine Ecology (3) & LAB (1/1)
BIOL 422	Coastal Ecology (4/2)
BIOL 443	Plant Ecology (4/2)
BIOL 449	Desert Ecology (4/2)
BIOL 466	Behavioral Ecology (3)

Ecology and Evolutionary Biology Elective Courses (3-4 units)

Course Number	Course Title (units)
BIOL 361	Human Anatomy (4/2)
BIOL 402	Computer Lab in Molecular Systematics (3/1)
BIOL 410	Evolutionary Genetics (4/2)
BIOL 444	Plant Physiological Ecology (4/2)
BIOL 468	Comparative Animal Physiology (4/1)
BIOL 483	Evolutionary Genomics and Aging (3)

Requirements continue on next page….

Ecology and Evolutionary Biology Capstone Courses (2 units)

Course Number	Course Title (units)
BIOL 400	Seminar in Biology Education (3)
BIOL 450	Conservation Biology (3)
BIOL 452	Global Change Biology (4/1)
BIOL 481	Advances in Evolution and Ecology (3)
BIOL 482	Capstone Studies in Biology (2/2)
BIOL 495	Biological Internship (3/2)
BIOL 498	Senior Thesis (1-3)
BIOL 499L	Independent Laboratory Study (1-3)
BIOL 483	Evolutionary Genetics and Aging (3)

Other Requirements:

- Physiology course; one of the following: BIOL 302 (General Microbiology), BIOL 362 (General Human Physiology), BIOL 444 (Plant Physiological Ecology), BIOL 445 (Plant Cell Physiology), BIOL 468 (Comparative Animal Physiology)
- 5 units of laboratory/field courses; 3 units must be taken within concentration-specific courses
- 6 units of 400-level biology courses

CONCENTRATION IN MARINE BIOLOGY

The Biology major is for students who are preparing to: 1) enter biology graduate and health professional schools, 2) seek biology-related careers in industry or government agencies, or 3) teach in secondary (grades 7-12) school.

	TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
COURSE 1	BIOL 151 (GE B2 & B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 325 3 units	BIOL 317 4 units	Upper-Division BIOL Elective 3-4 units	BIOL Capstone 2-3 units
COURSE 2	CNSM 101 (GE A3) 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective 3 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective complete required units
COURSE 3	MATH 130 or MATH 15B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units		
COURSE 4	GE A1 or A2 3 units	GA A1 or A2 3 units	GE D1/Z** 3 units	CHEM 306A 2 units	Upper-Division Writing 3 units	PHYS 211 3 units & PHYS 211L 1 unit	PHYS 212 3 units & PHYS 212L 1 unit	
COURSE 5	GE C1 or C2** 3 units	GE C1 or C2** 3 units	GE D2 3 units	GE F 3 units	GE E* 3 units		GE C3*/Z 3 units	D3*/Z 3 units
COURSE 6				American Government 3 units				Electives to complete 120 units
Units	**17 units**	**15 units**	**15 units**	**15 units**	**15-16 units**	**15 units**	**13-15 units**	**12-15 units**

Marine Biology Required Course (4 units)

Course Number	Course Title (units)
BIOL 317	Field Marine Biology (4/2)

Marine Biology Organismal Courses (4 units)

Course Number	Course Title (units)
BIOL 446	Marine Phycology (4/2)
BIOL 461	Marine Invertebrate Biology (4/2)
BIOL 475	Ichthyology (4/2)

Requirements continue on next page….

Marine Biology Ecology Courses (4 units)

Course Number	Course Title (units)
BIOL 419 & 419L	Marine Ecology (3) & Lab (1/1)
BIOL 422	Coastal Ecology (4/2)

Marine Biology Capstone Courses (2 units)

Course Number	Course Title (units)
BIOL 400	Seminar in Biology Education (3)
BIOL 401	Biogeography (3)
BIOL 422	Coastal Ecology (4/2)
BIOL 450	Conservation Biology (3)
BIOL 481	Advances in Evolution and Ecology (3)
BIOL 482	Capstone Studies in Biology (2/2)
BIOL 495	Biological Internship (3/2)
BIOL 498	Senior Thesis (1-3)
BIOL 499L	Independent Laboratory Study (1-3)

Other Requirements:

- Physiology course; one of the following: BIOL 302 (General Microbiology), BIOL 362 (General Human Physiology), BIOL 444 (Plant Physiological Ecology), BIOL 445 (Plant Cell Physiology), BIOL 468 (Comparative Animal Physiology)
- 5 units of laboratory/field courses; 3 units must be taken within concentration-specific courses
- 6 units of 400-level biology courses

CONCENTRATION IN MOLECULAR BIOLOGY AND BIOTECHNOLOGY

The Biology major is for students who are preparing to: 1) enter biology graduate and health professional schools, 2) seek biology-related careers in industry or government agencies, or 3) teach in secondary (grades 7-12) school.

	TERM 1	**TERM 2**	**TERM 3**	**TERM 4**	**TERM 5**	**TERM 6**	**TERM 7**	**TERM 8**
COURSE 1	BIOL 151 (GE B2 & B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 309 3 units	BIOL 325 3 units	Upper-Division BIOL Elective 3-4 units	BIOL Capstone 2-3 units
COURSE 2	CNSM 101 (GE A3) 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	BIOL 302 3 units & BIOL 302L 2 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective complete required units
COURSE 3	MATH 130 or MATH 15B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units		
COURSE 4	GE A1 or A2 3 units	GA A1 or A2 3 units	GE D1/Z** 3 units	CHEM 306A 2 units	Upper-Division Writing 3 units	PHYS 211 3 units & PHYS 211L 1 unit	PHYS 212 3 units & PHYS 212L 1 unit	
COURSE 5	GE C1 or C2** 3 units	GE C1 or C2** 3 units	GE D2 3 units	GE F 3 units		GE E* 3 units	GE C3*/Z 3 units	D3*/Z 3 units
COURSE 6				American Government 3 units				Electives to complete 120 units
Units	**17 units**	**15 units**	**15 units**	**15 units**	**14 units**	**17 units**	**13-15 units**	**12-15 units**

Molecular Biology and Biotechnology Required Course (6-8 units)

Course Number	Course Title (units)
BIOL 309	Intermediate Molecular Biology
BIOL 302 & 302L ***OR***	General Microbiology (3) & Lab (2/2)
CHEM 421	Biological Chemistry (3)

Requirements continue on next page….

Molecular Biology and Biotechnology Elective Courses (6-7 units)

Course Number	Course Title (units)
BIOL 402	Computer Lab in Molecular Systematics (3/1)
BIOL 405	Developmental Biology (3)
BIOL 410	Evolutionary Genetics (4/2)
BIOL 412	Principles of Gene Manipulation (3)
BIOL 413	Advances in Molecular Genetics (3)
BIOL 414	Microbial Genetics (3)
BIOL 426	Molecular Virology (3)
BIOL 430	Advances in Microbiology (3)
BIOL 431	Advanced Microbiology Lab (3/2)
BIOL 438	Public Health Microbiology (4/2)
BIOL 445	Plant Cell Physiology (3)
BIOL 448	Plant Molecular Biology (4/2)
BIOL 462	General Parasitology (4/2)
BIOL 472A	Advances in Biotechnology Lab (CHEM 472A) (3/2)
BIOL 472B	Advances in Biotechnology Lab (CHEM 472B) (3/2)
BIOL 483	Evolutionary Genomics and Aging (3)
BIOL 490T	Clinical Microbiology (3/2)
CHEM 421	Biological Chemistry (3)

Molecular Biology and Biotechnology Capstone Courses (2 units)

Course Number	Course Title (units)
BIOL 400	Seminar in Biology Education (3)
BIOL 412	Principles of Gene Manipulation (3)
BIOL 426	Molecular Virology (3)
BIOL 429	Techniques in Stem Cell Biology (3/2)
BIOL 430	Advances in Microbiology (3)
BIOL 431	Advanced Microbiology Lab (3/2)
BIOL 438	Public Health Microbiology (4/2)
BIOL 462	General Parasitology (4/2)
BIOL 472A	Advances in Biotechnology Lab (CHEM 472A) (3/2)
BIOL 472B	Advances in Biotechnology Lab (CHEM 472B) (3/2)
BIOL 482	Capstone Studies in Biology (2/2)
BIOL 490T	Clinical Microbiology (3/2)
BIOL 495	Biological Internship (3/2)
BIOL 498	Senior Thesis (1-3)
BIOL 499L	Independent Laboratory Study (1-3)

Requirements continue on next page….

Other Requirements:

- Physiology course; one of the following: BIOL 302 (General Microbiology), BIOL 362 (General Human Physiology), BIOL 444 (Plant Physiological Ecology), BIOL 445 (Plant Cell Physiology), BIOL 468 (Comparative Animal Physiology)
- 5 units of laboratory/field courses; 3 units must be taken within concentration-specific courses
- 6 units of 400-level biology courses

CONCENTRATION IN PLANT BIOLOGY

The Biology major is for students who are preparing to: 1) enter biology graduate and health professional schools, 2) seek biology-related careers in industry or government agencies, or 3) teach in secondary (grades 7-12) school.

	TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	TERM 7	TERM 8
COURSE 1	BIOL 151 (GE B2 & B3) 4 units	BIOL 152 4 units	BIOL 251 3 units	BIOL 252 3 units	BIOL 345 3 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective 3-4 units	BIOL Capstone 2-3 units
COURSE 2	CNSM 101 (GE A3) 3 units		BIOL 253L 1 unit	BIOL 254L 1 unit	BIOL 325 3 units	Upper-Division BIOL Elective 3 units	Upper-Division BIOL Elective 3-4 units	Upper-Division BIOL Elective complete required units
COURSE 3	MATH 130 or MATH 15B* (GE B4) 4 units	CHEM 120A (GE B1) 5 units	CHEM 120B 5 units	CHEM 301A 3 units	CHEM 301B 3 units	MATH 338 (GE B5) 4 units		
COURSE 4	GE A1 or A2 3 units	GA A1 or A2 3 units	GE D1/Z** 3 units	CHEM 306A 2 units	GE E* 3 units	PHYS 211 3 units & PHYS 211L 1 unit	PHYS 212 3 units & PHYS 212L 1 unit	
COURSE 5	GE C1 or C2** 3 units	GE C1 or C2** 3 units	GE D2 3 units	GE F 3 units	Upper-Division Writing 3 units		GE C3*/Z 3 units	D3*/Z 3 units
COURSE 6				American Government 3 units				Electives to complete 120 units
Units	**17 units**	**15 units**	**15 units**	**15 units**	**15 units**	**14-15 units**	**13-15 units**	**13-16 units**

Plant Biology Required Course (3 units)

Course Number	Course Title (units)
BIOL 345	Plant Biology (3/1)

Requirements continue on next page….

Plant Biology Elective Courses (7 units)

Course Number	Course Title (units)
BIOL 340	Field Botany (3/2)
BIOL 441	Plant Taxonomy (4/2)
BIOL 443	Plant Ecology (4/2)
BIOL 444	Plant Physiological Ecology (4/2)
BIOL 445	Plant Cell Physiology (3)
BIOL 446	Marine Phycology (4/2)
BIOL 448	Plant Molecular Biology (4/2)
BIOL 449	Desert Ecology (4/2)
GEOG 313	Natural Vegetation (3)

Plant Biology Capstone Courses (2 units)

Course Number	Course Title (units)
BIOL 450	Conservation Biology (3)
BIOL 482	Capstone Studies in Biology (2/2)
BIOL 495	Biological Internship (3/2)
BIOL 498	Senior Thesis (1-3)
BIOL 499L	Independent Laboratory Study (1-3)

Other Requirements:

- Physiology course; one of the following: BIOL 302 (General Microbiology), BIOL 362 (General Human Physiology), BIOL 444 (Plant Physiological Ecology), BIOL 445 (Plant Cell Physiology), BIOL 468 (Comparative Animal Physiology)
- 5 units of laboratory/field courses; 3 units must be taken within concentration-specific courses
- 6 units of 400-level biology courses

BIOLOGY MINOR: CELL AND MOLECULAR BIOLOGY

Science has become increasingly interdisciplinary with biophysics, biochemistry, bioengineering, psychology, and kinesiology as examples of disciplines that rely heavily on knowledge of biological science in the area of cell and molecular biology. Students majoring in these disciplines will be more competent and more competitive for graduate programs or employment with evidence of a minor that requires extensive education in cell and molecular biology. All courses must be passed with a C or better. Biology minors require a total of 21 Units.

Lower-Division (Core) Minor Courses (12 units)

Course Number	Course Title (units)
BIOL 151	Cellular and Molecular Biology (4)
BIOL 152	Evolution and Organismal Biology (4)
BIOL 251	Genetics (3)
BIOL 253L	Cell and Molecular Biology Skills Lab (1)

Upper-Division Required Minor Courses (3 units)

Course Number	Course Title (units)
BIOL 303 ***OR***	Intermediate Cell Biology (3)
BIOL 309	Intermediate Molecular Biology (3)

Upper-Division Cell and Molecular Electives (6-8 units)

Course Number	Course Title (units)
BIOL 302	General Microbiology (3)
BIOL 302L	General Microbiology Lab (2/2)
BIOL 362	General Human Physiology (4/1)
BIOL 402	Computer Lab in Molecular Systematics (3/1)
BIOL 405	Developmental Biology (3)
BIOL 411	Medical Genetics (3)
BIOL 412	Principles of Gene Manipulation (3)
BIOL 413	Advances in Molecular Genetics (3)
BIOL 414	Microbial Genetics (3)
BIOL 417	Advances in Cell Biology (3)
BIOL 418L	Advances in Cell Biology Lab (2/2)
BIOL 424	Immunology (5/2)
BIOL 426	Molecular Virology (3)
BIOL 427	Stem Cell Biology (3)
BIOL 428	Biology of Cancer (3)
BIOL 445	Plant Cell Physiology (3)
BIOL 438	Public Health Microbiology (4/2)
BIOL 448	Plant Molecular Biology (4/2)
BIOL 470	Cellular Neurology (3)
CHEM 421	Biological Chemistry (3)
CHEM 4231	General Biochemistry (3)

BIOLOGY MINOR: ENVIRONMENTAL BIOLOGY

Understanding and controlling our environment has become an important career path in the 21st century. Comprehending the biological science relevant to studying the environment is needed for students majoring in other disciplines to be more competitive for entry into graduate programs or into the work force. The minor will also provide students planning careers in secondary education science teaching with an expanded knowledge of environment-related issues. All courses must be passed with a C or better. Biology minors require a total of 21 Units.

Lower-Division (Core) Minor Courses (12 units)

Course Number	Course Title (units)
BIOL 151	Cellular and Molecular Biology (4)
BIOL 152	Evolution and Organismal Biology (4)
BIOL 252	Principles of Ecology (3)
BIOL 254L	Research Skills for Ecology and Organismal Biology (1)

Upper-Division Required Minor Courses (3 units)

Course Number	Course Title (units)
BIOL 325	Principles of Evolution (3)

Upper-Division Cell and Molecular Electives (6-8 units)

Course Number	Course Title (units)
BIOL 317	Field Marine Biology (4/2)
BIOL 340	Field Botany (3/2)
BIOL 345	Plant Biology (3/1)
BIOL 419	Marine Ecology (3)
BIOL 419L	Marine Ecology Lab (1/1)
BIOL 422	Coastal Ecology (4/2)
BIOL 441	Plant Taxonomy (4/2)
BIOL 443	Plant Ecology (4/2)
BIOL 444	Plant Physiological Ecology (4/2)
BIOL 446	Marine Phycology (4/2)
BIOL 449	Desert Ecology (4/2)
BIOL 450	Conservation Biology (3)
BIOL 461	Marine Invertebrate Biology (4/2)
BIOL 466	Behavioral Ecology (3)
BIOL 475	Ichthyology (4/2)
BIOL 476	Herpetology (4/2)
BIOL 478	Mammalogy (4/2)
BIIOL 479	Ornithology (4/2)
BIOL 481	Advances in Evolution and Ecology (3)

MINORS ASSOCIATED WITH BIOLOGY

Interested in Chemistry and Biochemistry? Minor in Chemistry
The Minor in Chemistry requires a total of 24 units, including 19 units of required courses and a minimum of 5 units of upper-division electives. All courses must be completed with a C or better. Visit the University Catalog for more information:
https://catalog.fullerton.edu/preview_program.php?catoid=91&poid=42946&hl=minor+chemistry&returnto=search

Interested in Forensics? Minor in Criminal Justice
The Criminal Justice minor requires 18 units, including core courses and electives. Non-required core courses may count as electives. In order to graduate with a Criminal Justice minor, students must earn a C- or better in all courses counted toward the minor and a minimum 2.0 GPA in the minor. Visit the University Catalog for more information:
https://catalog.fullerton.edu/preview_program.php?catoid=91&poid=42799&hl=criminal+justice+minor&returnto=search

Interested in working with the Elderly? Minor in Aging Studies
The Aging Studies minor is a specialty program designed to complement any major on campus. Students in the program study the process of aging, including physiological changes, social roles, normative expectations, attitudes and beliefs, stereotypes, policy, health and economic issues. Given the rapidly aging population, there is growing need for personnel trained in the diverse applications of aging. A minor in Aging Studies specifically prepares students interested in obtaining a Master's degree in Gerontology from CSUF, and more generally, increase job marketability in various professions, including health, education, engineering, business, human services, counseling, and more. Visit the University Catalog for more information:
https://catalog.fullerton.edu/preview_program.php?catoid=91&poid=42855&hl=public+health+minor&returnto=search

Interested in running a Biotech company? Minor in Business Administration
The Business Administration minor requires 27 units. Business administration minors shall not enroll in any required upper-division course (in the minor) until they have completed all of the required lower-division courses (in the minor) with a C or better in each course. Students must earn a C or better in each course required for the minor. Visit the University Catalog for more information:
https://catalog.fullerton.edu/preview_program.php?catoid=91&poid=42694&hl=business+administration+minor&returnto=search

RESEARCH AND OTHER OPPORTUNITIES FOR BIOLOGY MAJORS

Experiential Learning through Research in Biology

Undergraduate research in biology immerses students in scientific exploration for experiential learning experiences that deepen understanding and better develop critical skills. As a proven High-Impact Practice (HIP), experiential learning prepares undergraduate students for careers in biology and related fields, cultivates qualities such as curiosity, adaptability, and scientific creativity, and enhances skills in teamwork. The Biology program at CSUF offers multiple opportunities for students to engage in original research through *Course-based Undergraduate Research Experiences (CUREs)*, one-on-one mentoring in *Faculty-Student Collaborative Research* in the Department of Biological Science, and several formal *Research Programs*.

Course-based Undergraduate Research Experiences (CUREs)

Several upper-division courses in the Biology major incorporate the original research projects of faculty. Research conducted in the laboratory component of these courses mirrors the activities in the faculty research labs and brings the science described in lectures and textbook readings to life, while allowing students to earn required units for the *upper-division laboratory/field unit requirements*. The following undergraduate courses offer semester-long authentic Biology research experiences or modules (*) that expose students to the research process. ***BIOL 317: Field Marine Biology, BIOL 410: Evolutionary Genetics, BIOL 431: Advanced Microbiology Lab, BIOL 444: Plant Physiological Ecology, BIOL 448: Plant Molecular Biology, BIOL 449: Desert Ecology, BIOL 462: General Parasitology, BIOL 472A: Advances in Biotechnology Lab, *BIOL 354L: Research Skills for Ecology and Organismal Biology, *BIOL 302: General Microbiology & BIOL 302L: General Microbiology Laboratory, *BIOL 419L: Marine Ecology Laboratory,*** and ****BIOL 454L: Microscopy and Imaging in Biology.***

Faculty-Student Collaborative Research

Student research in the lab is an enriching educational experience that transcends traditional classroom learning. Collaborating with mentors, Biology students at CSUF contribute to ongoing projects, design experiments, and analyze data while gaining hands-on experience using experimental tools and techniques. For many students, this meaningful research experience has fostered a sense of community with other research students and a sense of ownership and responsibility for their work that instills a passion for life-long learning. Our undergraduate researchers leave CSUF with confidence and a solid foundation and tools for future success, making undergraduate research a truly transformative educational experience.

Students interested in undergraduate research can reach out directly year-round to Full-Time Faculty (https://www.fullerton.edu/biology/people/) in the Department of Biological Science to inquire about potential research opportunities in their labs. Alternatively, several programs at CSUF listed below support student research with specific mentors, with set deadlines for yearly applications.

Faculty-Student Collaborative Research is usually taken for credit in ***BIOL 299L: Directed Laboratory Study*** and ***BIOL 499L: Independent Laboratory Study***. Up to 3 units of BIOL 499L may count toward the major, serving as capstone and upper-division laboratory/filed units. Students engaged in undergraduate research labs are typically enrolled in *BIOL 480: Advanced Topics in Undergraduate Biology* with their faculty mentor, with up to 3 units counting as upper-division Biology electives toward the major.

Research Program Opportunities

Several programs at CSU Fullerton support student research with specific faculty mentors.

Bridges to Stem Cell Research (BSCR) Program. Stem cell research is one of the fastest growing segments within medicine and biotechnology. The BSCR program trains the next generation of undergraduate researchers to advance the field by learning the fundamental skills through a 7-month curriculum at CSUF. These students then complete a 12-month (Jan-Dec), full-time, paid internship at our partnering institutions: Stanford, UCI, and USC. California Institute for Regenerative Medicine hopes for students trained in stem cell research to enter the workforce at all levels, including research technicians, PhD, MD, DDS, MBA, etc. To learn more, visit the BSCR website: https://www.fullerton.edu/stemcells/

Creating Opportunities through Mentorship and Partnership Across Stem Cell Science (COMPASS) Program. The COMPASS program is an undergraduate research and internship program funded through a grant from the California Institute of Regenerative Medicine (CIRM). The aim of the program is to train a diverse cadre of undergraduates to enter the booming field of regenerative medicine directly after earning their bachelor's degree in biological science at CSUF. The two-year training program includes coursework, research, summer internships, and mentorship from faculty and recent alumni. Financial support is provided to make these year-round activities possible for the students accepted into the program. Seven students a year will be accepted as COMPASS scholars. To learn more, visit the COMPASS website: https://www.fullerton.edu/compass/index.html

Louis Stokes Alliance for Minority Participation (LSAMP). A participant can be a part of LSAMP and can also be funded by another undergraduate research program at CSUF. We hope that participants can eventually move to become Research Scholars. Participants can receive scholarships up to $3000. During the academic year, the research commitment is a minimum of 5-7 hours per week with additional expectations and requirements that vary each semester. Research Scholars can receive scholarships up to $5000 per year. To learn more, visit the LSAMP website: https://lsamp.fullerton.edu/

McNair Scholar Program. The Ronald McNair Scholars Program is a year-round program open to full-time students majoring in natural sciences, mathematics and engineering, and is designed to prepare students to pursue doctoral studies. Applicants must be a member of a group underrepresented in graduate education and/or a first-generation college student. Applicants must have completed at least 59 semester units and have a minimum GPA of 3.0. To learn more, visit the McNair website: https://www.fullerton.edu/mcnair/

Minority Health and Health Disparities Research Training (MHRT) Program. MHRT is a National Institutes of Health (NIH) sponsored program that provides students belonging to underrepresented minorities or health disparities groups with the opportunity to carry out research during the summer (10 weeks) at laboratories in the U.S. (Charles Drew University, George Washington University, Florida International University), Thailand (Chiang Mai University), or Argentina (Institute for Research on Retroviruses and AIDS), under the direction of world-renowned biochemists and molecular biologists. Fact sheets are available from the director, Dr. Marcelo Tolmasky (657-278-5263) or visit the MHRT website: http://biology.fullerton.edu/people/faculty/marcelo-tolmasky/MHIRT website/index.html

Neurocognitive Aging and Analytics Research Education (NAARE) Program. The NIH-funded NAARE program is open to full-time Biological Science majors. The NAARE program goals include teaching students about the human brain aging and providing mentored-research experiences with a focus on brain aging and etiology of certain neurodegenerative diseases such as Alzheimer's disease and related disorders. The program will also allow students to explore, engage, and analyze population-based studies and data related to brain aging. All participants are expected to undertake a summer research experience at the University of Southern California. To learn more, visit the NAARE website: https://naare.fullerton.edu/ or contact the NAARE Coordinator at naare@Fullerton.edu

Research Careers Preparatory (RCP) Program. The Cal State Fullerton RCP Program provides freshmen, sophomores, juniors, and new transfer students the opportunity to explore research as a career through a specially designed pro-seminar course, a laboratory skills training course, and field or laboratory research activities. Senior year students may be considered in some instances. The goals of the RCP are to: 1) raise student awareness of research careers and mentoring opportunities at CSUF and elsewhere in the country; 2) provide students with the hands-on experience and skill sets they need to be successful in their chosen career especially in research; and 3) move more CSUF graduates into research-based graduate or professional programs in the US or into the workforce within Orange County and throughout California. Participants in the program receive extensive research mentoring and academic support. To learn more, visit the RCP website: https://www.fullerton.edu/biology/rcp/index.php

Southern California Ecosystems Research Program (SCERP). SCERP is a research training program for undergraduates focused on learning through discovery in environmental biology. This program strives to attract primarily underrepresented students to environmental biology early in their academic careers, typically at the end of the sophomore or junior year. To learn more, visit the SCRP website: https://www.fullerton.edu/scerp/

Undergraduate Research Training Initiative for Student Enhancement (U-RISE) Program. The U-RISE Program at Cal State Fullerton aims to recruit, retain, and prepare promising undergraduate students from underrepresented groups (ethnicity, race, gender/LGBTQ+) or economically-disadvantaged background, and individuals with physical disability or neurodiverse, to successfully pursue a career in Biomedical Science research. To learn more, visit the U-RISE website: https://www.fullerton.edu/u-rise/

Scholarship and Research Funding

College of Natural Sciences and Mathematics & CSUF Scholarships. Cal State Fullerton offers a wide variety of scholarships and awards to honor outstanding achievement. Nearly $2 million in scholarships and awards are paid annually at Cal State Fullerton. Students apply for scholarships and are nominated for awards. Many CNSM scholarships use the University Scholarship and Award Application, and are generally due in early February. To learn more, visit the scholarship website: https://www.fullerton.edu/scholarships/scholarships/

WHAT CAN YOU DO WITH A BIOLOGY DEGREE?

Biology Department career information
The Biology Department and the CSUF Career Center are dedicated to student's career development. CSUF alumni pursue diverse and rewarding careers with many terrific opportunities in southern California. In order to prepare for future careers, students need to assess their skills, interests, and values, as well as research their options and plan their future. To learn more, visit the biology career website:
https://www.fullerton.edu/biology/careers/index.php

Career Center
Actively prepare for your future career! Explore: visit the Career Center to discover your strengths and possibilities for future success. Engage: attend Career Center events and workshops or utilize our resources to connect with yourself, employers, and the world at large. Execute: take action by scheduling an appointment with your College Career Specialist. To learn more or make an appointment, visit the Career Center:
https://www.fullerton.edu/career/
NSM College Career Specialist: Chanda Ishisaka cishisaka@Fullerton.edu; LH-208

Careers in biology (resources)
American Institute of Biological Science (AIBS): https://www.aibs.org/careers/
College Grad: https://collegegrad.com/

Careers in cell and molecular biology (resources)
Nature:
https://www.nature.com/naturecareers/?gad_source=1&gclid=CjwKCAjwr7ayBhAPEiwA6EIGxP1Ljl2VSidC0S0clqlFkmKtRn0Maz8TfTuykcXfyg0uIEKvBrlfbRoC-NQQAvD_BwE

Careers in organismal, ecology, or marine biology (resources)
Ecological Society of America (ESA): https://www.esa.org/career-development/opportunities-at-esa/
The Society for Integrative and Comparative Biology (SICB): https://sicb.org/resources/career-information/
The Wildlife Society (TWS): https://careers.wildlife.org/

Careers in teaching
See *Teach Science – Impact the Future* in this handbook

Careers in health care
See *Health Professions as a Biology Major* in this handbook

Careers in scientific research
See *Research and Other Opportunities for Biology Majors* in this handbook

TEACH SCIENCE – IMPACT THE FUTURE!

Steps to Earning a Teaching Credential in Science

Step 1: Make an Appointment!

- Make an appointment with the Science Credential Preparation Advisor: Dr. Megan Tommerup mtommerup@fullerton.edu
- Design an academic plan, discuss prerequisites for the Credential Program and explore resources to help you prepare for a career in teaching.
- Additional advising is available at the Center for Careers in Teaching: https://ed.fullerton.edu/cct/

Step 2: Work on your Biology Major Requisites

- Any of the Biology Concentrations provide support for demonstrating subject matter competence in the fields of Biology and General Science appropriate for Middle and High School Science teaching (grades 7 – 12).

Step 3: Take Secondary Education (EDSC) Prerequisite coursework

- Coursework may be completed during your undergraduate education or as a post baccalaureate.
- Some courses may count as GE or electives
- Prerequisite coursework includes:
    - EDSC 310: The Teaching Experience – Participation
    - EDSC 320: Adolescent Development
    - EDSC 330: Developing Literacy in Secondary Schools
    - EDSC 340: Diversity in Secondary Schools

Step 4: Attend a Secondary Education Credential Program Overview

- Attend a Single Subject Credential Program Overview: https://ed.fullerton.edu/seced/
    - Learn about the application process and specific requirements for the program
    - Additional information about the Secondary Education Credential program: https://ed.fullerton.edu/seced/academic-programs/cred-seced.php
- Prepare Application Materials
    - Demonstrate basic skills by passing the CBEST: https://www.ctcexams.nesinc.com/
    - Demonstrate subject matter competency by passing the appropriate California Subject Examination (CSET) subtests: https://www.ctcexams.nesinc.com/
    - Additional application materials may include fingerprinting, CPR training, and English Language proficiency: https://ed.fullerton.edu/seced/admissions/cred-seced.php

Step 5: Explore Resources for Teaching Candidates

- Example: financial opportunities to support students while they are earning their credential. The *Intern/Professional Track Program* allows sciences teachers to earn their credential while employed: https://ed.fullerton.edu/seced/sscphandbook/program-design/intern_program.php
- STEM Scholarships and Internships are available to undergraduates including:
    - The Math and Science Teacher Initiative (MSTI) scholarships program: https://ed.fullerton.edu/msti/_scholarships/index.php

- Science Ambassadors Program: https://ed.fullerton.edu/msti/resources/scholarships-stipends.php
- Promoting Resources in Informal Science Education (PRISE) internships: http://ed.fullerton.edu/msti/resources/scholarships-stipends.php

For more information, please contact Dr. Megan Tommerup, Science Credential Preparation Program Coordinator, mtommerup@fullerton.edu

HEALTH PROFESSIONS AS A BIOLOGY MAJOR

The basic requirements for most Health Professions Programs (e.g., pharmacy, medicine, dentistry, optometry, veterinary medicine, physical therapy, physician assistant) are a year of biology with lab, a year of organic chemistry with lab, a semester of statistics, and a semester of calculus – all of which you will receive as a biology major at CSUF. There are few upper-division required courses but often specific courses are recommended, and these can vary depending on the field you'd like to go into and the schools to which you plan to apply. The best place for you to get this information is at the Health Professions Advising Office (see below) on campus and look at the information available for the schools you'd like to attend (see below). Every concentration in the Biology major can prepare you to go into a health profession. You should choose your concentration based on what you are passionate about because that will help you to be motivated to achieve the high level of academic performance needed to obtain entrance into a professional program (see CONSIDERING HEALTH PROFESSIONAL SCHOOL BUT INTERESTED IN ECOLOGY, ORGANISMAL, OR MARINE BIOLOGY).

You can find more information about requirements, exams, etc., for various health professions at the:

- CSUF Health Professions Advising Office: https://www.fullerton.edu/healthprofessions/
- Association of American Medical Colleges: https://www.aamc.org/
- American Association of Colleges of Osteopathic Medicine: https://www.aacom.org/
- American Association of Colleges of Pharmacy: https://www.aacp.org/
- Association of Schools and Colleges of Optometry: https://optometriceducation.org/
- American Dental Education Association: https://www.adea.org/
- Physician Assistant Education Association: https://paeaonline.org/
- American Physical Therapy Association: https://www.apta.org/
- Association of American Veterinary Medical Colleges: https://www.aavmc.org/

Professional schools have specific course requirements and activities that students should be aware of. For instance, basic science research, clinical work, and extra-curricular and community service are very important in building a strong application. A health professions advisor will be able to point out appropriate courses and activities and, in many cases, recommend specific programs that students should participate in.

Students may use the facilities of the Health Professions Advising Office as needed. Starting in their sophomore year students should seek advising at least once a semester prior to registration. Meeting with a health professions advisor does not take the place of mandatory advising through the Biological Science Department.

Other services that the Health Professions Advising Office provides include helping students select appropriate clinical career paths and the professional schools appropriate for their needs. An advisor will make suggestions on how students might improve their applications and personal statements and provide advice related to letters of recommendation and the interview process. When requested, mock interviews can be arranged through the Career Development Center. The Health Professions Advising Office also supervises on-campus clubs, such as the Student Health Professions Association. A complete listing of Student Organizations affiliated with the Health Professions Office can be found on their website (see below). In addition, the Health Professions Advising Office evaluates files prepared by students who submit applications and, where appropriate, will prepare committee letters of support for qualified students.

Visit The Health Professions Advising Office website: https://www.fullerton.edu/healthprofessions/ or email them at: hpadvising@fullerton.edu

CONSIDERING HEALTH PROFESSIONAL SCHOOL BUT INTERESTED IN ECOLOGY, ORGANISMAL, OR MARINE BIOLOGY?

Odds are you will perform best in courses that you enjoy and are interested in. After finishing your 19 units of biology core courses, you can choose a concentration in Ecology and Evolutionary Biology (EEB), Marine Biology (MB), or Plant Biology (PB) and still take the courses you will need to do well on entrance exams (e.g., MCAT, DAT, GRE) and meet prerequisites for health professional schools. The EEB, MB, and PB concentrations have physiology requirements that can be fulfilled by taking BIOL 302 & 302L (Microbiology & Lab) or BIOL 362 (General Human Physiology) and free elective units which can be used to take BIOL 361 (Human Anatomy) and/or CHEM 421 (Biochemistry), or BIOL 302 & 302L and BIOL 362 if not taken for the physiology overlay. EEB, MB, and PB also provide the broad training in biology that will help should you decide to change your career path to teaching or another general biology field.

RESOURCES FOR BIOLOGY MAJORS

College of Natural Science and Mathematics (CNSM) Student Success Team
Website: https://www.fullerton.edu/nsmssc/
The NSM Student Success Center in MH-488 provides a quiet place to study, with desktops and laptop docking hubs for student use. The NSM peer tutoring program offers tutoring in every NSM discipline. The Student Success Team (SST) also hold events and workshops during the semester. The NSM Advising offices are located in MH-129. The SST provides the guidance, tools, and support needed to progress toward graduation and achieve your academic goals. NSM majors have access to both SST Advisors and Faculty Advisors within your major. SST Advisors meet with students year-round and provide advising with: General Education, academic challenges and concerns, lower-division major requirements, University policies, exploring major changes, and graduation advising. The NSM Career Specialist provides career guidance and graduate school planning.

Student Success Team Advisors and Career Specialist
Tanya Kim, Assistant Director of Academic Advising
MH-129A; 657-278-3275
takim@fullerton.edu
Focus on: Athletes, CA Promise, Fullerton Finish, Honors, New transfer students

Abraham Roldan, College Advisor
MH-129D; 657-278-7217
aroldan@fullerton.edu
Focus on: Undergraduate last names from A-Gl

Axis Avalos, Graduation Specialist
MH-135A; 657-278-2301
axavalos@fullerton.edu
Focus on: Graduation Candidates and Applicants

Natalie Mir, College Advisor
MH-129C; 657-278-8750
http://namir@fullerton.edu
Focus on: Undergraduate last names from Go-N

Kristin Nguyen, College Advisor
MH-129B; 657-278-3130
krnguyen@fullerton.edu
Focus on: Undergraduates last names from O-Z

Chanda Ishisaka, Career Specialist
LH-207D; 657-278-2020
cishisaka@fullerton.edu

To make an appointment with one of the SST Advisors listed above, visit: https://www.fullerton.edu/nsmssc/advising/. If you aren't sure who to contact, you can complete the SSC Team Request form, and an advisor will respond to your inquiry.

Tutoring

Located in MH-488 To view the tutoring schedule and/or to make an appointment, visit: https://www.fullerton.edu/nsmssc/tutoring/index.html
Biology, Chemistry and Biochemistry, and Physics: 657-278-7082
Math: 657-278-3631
Supplemental Instruction: https://www.fullerton.edu/si/
University Learning Center: PLN-1st floor; 657-278-4738 https://www.fullerton.edu/ulc/
Writing Center: PLN-100; 657-278-3650 http://english.fullerton.edu/writing_center/

Career Resources

Career Center: LH-208; 657-278-3121 https://www.fullerton.edu/career/
Center for Internships and Community Engagement: LH-206; 657-278-3746 https://www.fullerton.edu/cice/
Health Professions Advising Office: GH-223; 657-278-3980 https://www.fullerton.edu/healthprofessions/

Other Resources

For a complete listing, visit the *Student Affairs* website: https://www.fullerton.edu/sa/
Scholarships: https://www.fullerton.edu/financialaid/general/scholarships.php
CSUF Student Clubs: https://www.fullerton.edu/sll/involvement/clubs/
Student Wellness: https://www.fullerton.edu/studentwellness/
Counseling and Psychological Services: https://www.fullerton.edu/caps/
Health Center: https://www.fullerton.edu/health/
Titan Well: https://www.fullerton.edu/titanwell/
Tuffy's Basic Needs Services: MH-142; 657-278-3583 https://www.fullerton.edu/basic-needs/
Disability Support Services: GH-101; 657-278-3112 https://www.fullerton.edu/dss/
African American Resource Center: PLS-188, room 182; 657-278-3742 https://www.fullerton.edu/aarc/
Asian Pacific American Resource Center: PLS 180, room 187; 657-278-3742 https://www.fullerton.edu/aparc/
Latinx Resource Center: PLS-180, room 184; 657-278-2537 https://www.fullerton.edu/lcrc/
First-Generation Resources: LH-805; 657-278-3221 https://www.fullerton.edu/sa/students/firstgen.html
LGBT Queer Resource Center: PLS-180, room 189; 657-278-4218 https://www.fullerton.edu/lgbtq/
Titan Dreamers Resource Center: PLS-180 room 185; 657-278-3234 https://www.fullerton.edu/tdrc/
Women's Resource Center: LH-556 https://www.fullerton.edu/dirc/resource-centers/Womens Resource Center.php
Adult Re-Entry and Parenting Student Programs: GH-205; 657-278-3928 https://www.fullerton.edu/adultreentry/
Veterans Student Services: GH-230; 657-278-8660 https://www.fullerton.edu/veterans/

ADMINISTRATIVE OFFICES

	Phone ext. (657-278-)	Location
California State University Fullerton; General Information	2011	
Department of Biological Science (biolsci@fullerton.edu)	3614	MH-205
Academic Advising Questions (bioladvising@fullerton.edu)		
Administrative Support Coordinator (Karen Lau)	3614	MH-205A
Single Subject Teaching Credential Advisor (Dr. Megan Tommerup)	5283	MH-211C
Biology Minor Advisor (Dr. Megan Tommerup)	5283	MH-211C
CNSM Student Success Center (https://www.fullerton.edu/nsmssc/)		
NSM Tutoring		MH-488
Biology, Chemistry and Biochemistry, Physics	7082	
Math	3631	
Asst. Director Academic Advising (Tanya Kim)	3275	MH-129A
Graduation Specialist (Axis Avalos)	2301	MH-135A
College Advisor (Natalie Mir)	8750	MH-129C
College Advisor (Abraham Roldan)	7217	MH-129D
College Advisor (Kristin Nguyen)	3130	MH-129B
Career Specialist (Chanda Ishisaka)	2020	LH-208
Academic Advisement Center (advising for GE, undeclared majors)	3606	GH-123
Admission and Records	2300	LH-114
Career Planning and Placement Center	3121	LH-208
Center for Careers in Teaching	7130	EC-379
College of Natural Science and Mathematics Dean's Office	2638	MH-166
Counseling and Psychological Services (CAPS)	3034	SHCC
Dean of Students	4436	TSU-243
Disability Support Services	3117	GH-101
Financial Aid	3125	GH-146
Health Professions Advising Office	3980	GH-223
Library	2714	Pollak Library
Student Health Center	2800	SHCC
Testing Center	2288	MH-525
Transfer Resource Center	8398	MH-525
Tutoring for NSM Students	7082	MH-488

DEPARTMENT OF BIOLOGICAL SCIENCE FACULTY

**Year joined faculty at CSUF*

ABRAHAM, Joel K. *2011 Professor; Ph.D., UC Berkeley

Teaches: Evolution and Organismal Biology, Seminar in Biology Education, Plant Ecology, Professional Aspects of Biology: Teaching Effectiveness

Research: Biology education, educational technology, graphing skills, plant ecology, urban agriculture

Office: MH-224B; Phone 657-278-3138; jkabraham@Fullerton.edu

BRENNAN, Catherine *2013 Associate Professor; Ph.D., University of Southern California

Teaches: Immunology, Intermediate Cell Biology, Cellular and Molecular Biology

Research: Innate immunity, phagocytosis, genetic approaches to cell biology, *Drosophila*

Office: DBH-112A; Phone 657-278-3637; cbrennan@Fullerton.edu

BURNAFORD, Jennifer *2009 Professor; Ph.D., Oregon State University

CSUF Chapter of the SACNAS Diversity in STEM Society, Faculty Advisor

Teaches: Coastal Ecology, Marine Phycology, Scientific Communication Workshop

Research: Marine community ecology, species interactions, abiotic factors influencing species distributions

Office: MH-211E; Phone 657-278-2382; jburnaford@Fullerton.edu

CHEN, Ester J. *2006 Professor; Ph.D., Massachusetts Institute of Technology

Teaches: Genetics, General Microbiology, Advances in Molecular Genetics

Research: Molecular biology of microbe-host interactions, genes and signals in the symbiosis between *Sinorhizobium meliloti* and its host, *Medicago sativa*

Office: MH-224C; Phone 657-278-2542; echen@fullerton.edu

COHEN, Amybeth *1997 Professor; Ph.D. UC Riverside

Department of Biological Science, Chair

Teaches: Genetics, Principles of Gene Manipulation, Plant Cell Biology

Research: Regulation of photosynthetic gene expression in plant cells, nuclear-chloroplast interactions, expression of foreign therapeutic proteins in the unicellular green alga, *Chlamydomonas reinhardtii*

Office: MH-205B; Phone 657-278-2178; acohen@fullerton.edu

CUAJUNGCO, Math P. *2007 Professor; Ph.D., University of Auckland, New Zealand

Undergraduate Research Training Initiative for Student Enhancement (U-RISE) Program, Director
Neurocognitive Aging Analytics Research and Education (NAARE) Program, Co-Investigator

Teaches: Cellular and Molecular Biology, Cellular Neurobiology

Research: Molecular, structural, and cellular biology of transient receptor potential Mucolipin (TRPML) ion channels and transmembrane proteins: TMEM163 (ZnT11), TMEM176A, and TMEM176B, zinc neurobiology and zinc transporters, metallobiology of mucolipidosis type IV (MLIV) and other

neurodegenerative diseases

Office: MH-224E; Phone 657-278-8552; mcuajungco@fullerton.edu

DER, Joshua *2015 Associate Professor; Ph.D., Utah State University

Teaches: Principles of Evolution, Population Genetics, Plant Biology, Plant Taxonomy

Research: Plant evolutionary genomics, plant systematics, bioinformatics, molecular evolution, evolution of life history transitions in parasitic plants (esp. mistletoes) and land plants (esp. ferns)

Office: MH-640A; Phone 657-278-4115; jder@fullerton.edu

EERNISSE, Douglas J. *1994 Professor; Ph.D., UC Santa Cruz

Teaches: Evolution, Field Marine Biology, Molecular Systematics, Invertebrate Zoology

Research: Animal phylogeny, evolution of Mollusca, marine zoology, systematics, population genetics, bioinformatics

Office: MH-636A; Phone 657-278-3749; deernisse@fullerton.edu

FORSGREN, Kristy L. *2012 Professor; Ph.D., University of Washington

Teaches: General Human Physiology, Comparative Animal Physiology, Vertebrate Biology, Professional Aspects of Biology: Teaching Effectiveness

Research: Fish reproductive morphology, physiology, and endocrinology

Office: MH-319A; Phone 657-278-4573; kforsgren@fullerton.edu

HOESE, Willian J. *2000 Professor; Ph.D., Duke University

Teaches: Think Like Einstein, Elements of Biology, Evolution and Organismal Biology, Principles of Evolution, Ornithology, Professional Aspects of Biology: Teaching Effectiveness

Research: Biology education, student learning, animal communication, functional Morphology

Office: MH-301B; Phone 657-278-2476; bhoese@fullerton.edu

JIMENEZ ORTIZ, Vernica *2013 Associate Professor; Ph.D., University of Chile

Teaches: Advances in Cell Biology, Intermediate Cell Biology, General Parasitology

Research: Role of ion channels in sensing and adaptation to environmental conditions in protozoan parasites, mechanosensation, electrophysiology

Office: MH-307; Phone 657-278-2477; vjimenezortiz@fullerton.edu

JOHNSON, Hope A. *2008 Professor; Ph.D., Standford University

Teaches: Genetics, General Microbiology, Advanced Microbiology Lab

Research: Microbial metal oxidation and reduction – the formation and dissolution of rocks, identifying the function of bacterial proteins with no known function, water quality and bioremediation

Office: MH-211F; Phone 657-278-4529; hajohnson@fullerton.edu

MIYAMOTO, Alison *2008 Associate Professor; Ph.D., Stanford University

Creating Opportunities through Mentorship and Partnership Across Stem Cell Science (COMPASS), Director

Teaches: Cellular and Molecular Biology, Intermediate Cell Biology, Developmental Biology, Stem Cell Biology, Microscopy and Imaging in Biology
Research: Molecular mechanisms of Notch receptor signaling by typical and atypical ligands, developmental and cell biology of elastic fiber proteins
Office: DBH-114A; Phone 657-278-2540; almiyamoto@fullerton.edu

NIKOLAIDIS, Nikolas *2008 Professor; Ph.D., Aristotle University of Thessaloniki, Greece
Teaches: Genetics, Bioinformatics, Medical Genetics
Research: Comparative genomics, bioinformatics, phylogenetics, molecular evolution and biochemistry of proteins involved in the innate and adaptive immune systems and stress response
Office: MH-317A; Phone 657-278-4526; nnikilaidis@fullerton.edu

OLBERDING, Jeffrey *2021 Assistant Professor; Ph.D., University of South Florida
Teaches: General Human Physiology, Comparative Animal Physiology, Herpetology
Research: Muscle physiology, biomechanics, scaling and thermal biology of organismal movement
Office: MH-225C; Phone 657-278-7294; jolberding@fullerton.edu

PAIG-TRAN, Erin (Misty) *2014 Associate Professor; Ph.D., University of Washington
Teaches: Ichthyology, Human Anatomy, Field Marine Biology
Research: Functional anatomy, biomechanics, biomimetics and biomaterials
Office: DBH-249; Phone 657-278-5921; empaig-tran@fullerton.edu

PATEL, Nilay *2006 Associate Professor; Ph.D., State University of New York at Stony Brook
CIRM Bridges to Stem Cell Research Program, Director
MSTEM STAR, Co-Investigator
Teaches: Cellular and Molecular Biology, Intermediate Biology, Techniques in Stem Cell Biology
Research: Niclosamide and related drugs block cell proliferation by modulating signal transduction and gene expression
Office: DBH-111A; Phone 657-278-2483; npatel@fullerton.edu

RAMIREZ, Maria Soledad *2014 Professor; Ph.D., University of Buenos Aires
Teaches: Advances in Microbiology, General Microbiology, Clinical Microbiology, Public Health Microbiology
Research: Molecular mechanisms of antibiotic resistance, their dissemination, evolution, as well as impact in the morbidity and mortality of bacterial infections
Office: DBH-117A; Phone 657-278-4562; msramirez@fullerton.edu

SACCO, Melaine *2008 Professor; Ph.D., University of London
Teaches: Genetics, Intermediate Molecular Biology, Molecular Virology, Principles of Gene Manipulation, Plant Molecular Biology, Scientific Communication Workshop

Research: Molecular biology of plant-pathogen interactions, protein-protein interactions and signaling in disease resistance, nematode endogenous retroviruses
Office: MH-685A; Phone 657-278-2539; msacco@fullerton.edu

SANDQUIST, Darren R. *1999 Professor; Ph.D., University of Utah
Teaches: Principles of Ecology, Plant Biology, Plant Physiological Ecology, Field Botany, Plant Ecology, Desert Ecology
Research: Desert plant ecology, evolution and ecology of plant physiology, biogeochemistry, applications of stable isotopes in ecological research, invasive species
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SCHENK, H. Jochen *2002 Professor; Ph.D., UC Santa Barbara
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