BACHELOR OF SCIENCE IN BIOLOGY: CONCENTRATION IN ZOOLOGY

Impaction
All Biology concentrations are currently impacted which means there are more applications than capacity. Transfer student applications for admission to this major are accepted by the University’s Office of Undergraduate Admissions only during the application filing period of October 1 to November 30 (for admission the following fall). No late applications or applications for spring will be considered. Both new transfer and on-campus students wishing to change majors are required to submit an additional departmental application. See departmental website biology.sfsu.edu (http://biology.sfsu.edu) for supplemental program application and deadlines.

General Information and Requirements
• Candidates entering the bachelor’s programs in biology should have completed three years of high school mathematics and one year of high school chemistry to allow completion of the curriculum in a timely fashion (see Undergraduate Admission Requirements (bulletin.sfsu.edu/undergraduate-admissions/application-procedures/#UAR)).
• All major course work must be completed with letter grades (CR/NC is not acceptable).
• A minimum grade point average of 2.0 in all course work is required to receive a degree in these programs.
• To remain enrolled in a biology course, students must be prepared to provide copies of transcripts demonstrating completion of prerequisite courses with a grade of C- or better.
• At least 12 units in biology must be completed at SF State.
• Early in the first semester, and at regular intervals thereafter, students must consult with a biology advisor to plan a program of study. For the most current advising information, go to biology.sfsu.edu (http://biology.sfsu.edu).

Graduation Writing Assessment Requirement (GWAR)
(Note: Prior to fall 2012, GWAR would have been satisfied by passing ENG 414 or (ENG 410 or ENG 411 for CMS students) or a GWAR designated course from another discipline.)

Students must earn a C or better in a GWAR course to satisfy the requirement.

Biology majors have flexibility for which GWAR course they can take to meet their requirement, as long as the prerequisites for the course have been completed.

In general,
• Cell & Molecular Biology majors should take BIOL 351GW;
• Microbiology majors should take BIOL 402GW;
• Botany, Ecology, and Zoology majors may choose between BIOL 475GW, BIOL 478GW or BIOL 529GW;
• Marine Biology majors may choose between BIOL 570GW or BIOL 631GW; and
• Physiology majors may choose between BIOL 613GW or BIOL 631GW.
• General Biology majors may take any BIOL GWAR class.

See also the Department of Biology home page for GWAR in Biology: biology.sfsu.edu/content/gwar (http://biology.sfsu.edu/content/gwar) or contact a departmental advisor for further information.

The department does not permit multiple concentrations within the biology degree program. All of the curricula require preliminary work in physics and chemistry because many important biological concepts are based squarely upon principles in the physical sciences. Also, each curriculum includes upper division work in the biological sciences so that students will receive reasonable breadth and depth in their degree program. Because of the sequential arrangement of courses students are urged to consult the descriptions for the prerequisites of all their courses.

Although course electives are listed for most of the majors, new electives are always being added to various programs. Therefore, we highly recommend that students seek advisement prior to enrolling in elective courses in their major.

Concentration in Zoology
This program provides students with a broad background in animal biology through coursework in evolutionary biology, ecology, behavior, anatomy, and physiology of both vertebrate and invertebrate animals. It is recommended that a background in both vertebrate and invertebrate biology be obtained through selection of appropriate elective courses.

Biology (B.S.): Concentration in Zoology — 67 units

General Education Met in the Major
General Education requirements met in the Biology major (all concentrations) or Undeclared with Interest in Biology:
The requirements below are deemed “met in the major” upon completion of the courses listed (even though the courses and their prerequisites are not approved for GE). This is true whether or not the student completes the major.

• Area B1 (Physical Science) is satisfied upon completion of CHEM 130 or CHEM 233.
• Areas B2 (Life Science) and B3 (Laboratory Science) are satisfied upon completion of BIOL 240.
• Upper Division General Education, Physical, and Life Sciences (UD–B) is satisfied upon completion of BIOL 355.

Lower Division Requirements (34–35 units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 230</td>
<td>Introductory Biology I</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 240</td>
<td>Introductory Biology II</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 115</td>
<td>General Chemistry I: Essential Concepts of Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 130</td>
<td>General Organic Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

Select 16–17 units from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 215 &amp; CHEM 216</td>
<td>General Chemistry II: Quantitative Applications of Chemistry Concepts and General Chemistry II Laboratory: Quantitative Applications of Chemistry Concepts</td>
</tr>
<tr>
<td>MATH 226</td>
<td>Calculus I</td>
</tr>
</tbody>
</table>
MATH 227  Calculus II
PHYS 111  General Physics I
& PHYS 112  and General Physics I Laboratory
PHYS 121  General Physics II
& PHYS 122  and General Physics II Laboratory

Upper Division Requirements (19–21 units)
BIOL 337  Evolution 3
BIOL 355  Genetics 3
BIOL 458  Biometry 4
Select one on advisement of the following: 3
  BIOL 350  Cell Biology
  BIOL 357  Molecular Genetics
  BIOL 380  Evolutionary Developmental Biology
  BIOL 382  Developmental Biology
  BIOL 453  General Parasitology
  BIOL 600  Animal Behavior
  BIOL 612  Human Physiology
  BIOL 620  Endocrinology
  BIOL 621  Reproductive Physiology
  BIOL 630  Animal Physiology
Select 3–4 units on advisement from the following: 3-4
  BIOL 482  Ecology
  BIOL 529GW  Plant Ecology - GWAR
  BIOL 530  Conservation Biology
  BIOL 532  Restoration Ecology
  BIOL 534  Wetland Ecology
  BIOL 577  Ecological and Environmental Modeling
  BIOL 580  Limnology
  BIOL 582  Biological Oceanography
  BIOL 585  Marine Ecology
  BIOL 586  Marine Ecology Laboratory

Taxonomy or Whole Organism Biology of an Invertebrate or Vertebrate
Select one course upon advisement.
  BIOL 460  General Entomology
  BIOL 461  Insect Taxonomy
  BIOL 464  Medical Entomology
  BIOL 475GW  Herpetology - GWAR
  BIOL 478GW  Ornithology - GWAR
  BIOL 555  Marine Invertebrate Zoology
  BIOL 570GW  Biology of Fishes - GWAR

Electives (7–11 units)
Upon advisement choose from the alternates not used in fulfilling the requirements listed above or any other upper division biology courses not specifically excluded for major credit, or any graduate biology course.

Note: A minimum of 40 upper division units must be completed for the degree (including upper division units required for the major, general education, electives, etc.). A student can complete this major yet not attain the necessary number of upper division units required for graduation. In this case, additional upper division courses will be needed to reach the required total.

General Educations Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Course Level</th>
<th>Units</th>
<th>Area Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Communication</td>
<td>LD</td>
<td>3</td>
<td>A1</td>
</tr>
<tr>
<td>Written English Communication I</td>
<td>LD</td>
<td>3</td>
<td>A2</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>LD</td>
<td>3</td>
<td>A3</td>
</tr>
<tr>
<td>Written English Communication II</td>
<td>LD</td>
<td>3</td>
<td>A4</td>
</tr>
<tr>
<td>Physical Science</td>
<td>LD</td>
<td>3</td>
<td>B1</td>
</tr>
<tr>
<td>Life Science</td>
<td>LD</td>
<td>3</td>
<td>B2</td>
</tr>
<tr>
<td>Lab Science</td>
<td>LD</td>
<td>1</td>
<td>B3</td>
</tr>
<tr>
<td>Mathematics/Quantitative Reasoning</td>
<td>LD</td>
<td>3</td>
<td>B4</td>
</tr>
<tr>
<td>Arts</td>
<td>LD</td>
<td>3</td>
<td>C1</td>
</tr>
<tr>
<td>Arts or Humanities</td>
<td>LD</td>
<td>3</td>
<td>C1 or C2</td>
</tr>
<tr>
<td>Humanities: Literature</td>
<td>LD</td>
<td>3</td>
<td>C3</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>LD</td>
<td>3</td>
<td>D1</td>
</tr>
<tr>
<td>Social Sciences: US History</td>
<td>LD</td>
<td>3</td>
<td>D2</td>
</tr>
<tr>
<td>Social Sciences: US &amp; CA Goverment</td>
<td>LD</td>
<td>3</td>
<td>D3</td>
</tr>
<tr>
<td>Lifelong Learning and Self-Development (LLD)</td>
<td>LD or UD</td>
<td>3</td>
<td>E</td>
</tr>
<tr>
<td>Physical and/or Life Science</td>
<td>UD</td>
<td>3</td>
<td>UD-B</td>
</tr>
<tr>
<td>Arts and/or Humanities</td>
<td>UD</td>
<td>3</td>
<td>UD-C</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>UD</td>
<td>3</td>
<td>UD-D</td>
</tr>
</tbody>
</table>

SF State Studies
Courses certified as meeting the SF State Studies requirements may be upper or lower division in General Education (GE), in a major or minor, or an elective.

American Ethnic and Racial Minorities (AERM) | LD or UD | 3
Environmental Sustainability (ES) | LD or UD | 3
Global Perspectives (GP) | LD or UD | 3
Social Justice (SJ) | LD or UD | 3

Note: LD = Lower Division; UD = Upper Division.
First-Time Student Roadmap (4 Year)
This roadmap opens in a new tab. (bulletin.sfsu.edu/colleges/science-engineering/biology/bs-biology-concentration-zoology/roadmap.html)

Transfer Student Roadmap (2 Year)
For students with an AS-T in Biology. This roadmap opens in a new tab. (bulletin.sfsu.edu/colleges/science-engineering/biology/bs-biology-concentration-zoology/adt-roadmap.html)

This degree program is an approved pathway (“similar” major) for students earning the ADT in Biology
California legislation SB 1440 (2009) mandated the creation of the Associate Degree for Transfer (ADT) to be awarded by the California Community Colleges. Two types of ADTs are awarded: Associate in Arts for Transfer (AA-T) and Associate in Science for Transfer (AS-T). Note: no specific degree is required for admission as an upper-division student. However, the ADT includes specific guarantees related to admission and graduation, and is designed to clarify the transfer process and strengthen lower-division preparation for the major. An ADT totals 60 units and includes completion of all lower-division General Education requirements and at least 18 units in a specific major. Students pursuing an ADT are guaranteed admission to the CSU if minimum eligibility requirements are met, though not necessarily to the CSU campus of primary choice. Upon verification that the ADT has been awarded prior to matriculation at SF State, students are guaranteed B.A. or B.S. completion in 60 units if pursuing a “similar” major after transfer. Determinations about “similar” majors at SF State are made by faculty in the discipline. Degree completion in 60 units cannot be guaranteed when a student simultaneously pursues an additional major, a minor, certificate, or credential. A sample advising roadmap for students who have earned an ADT and continue in a “similar” major at SF State is available on the Roadmaps tab and displays:

• How many lower-division units required for the major have been completed upon entry based on award of a specific ADT;
• Which lower-division requirements are considered complete upon entry based on award of a specific ADT;
• How to complete the remaining 60 units for the degree in four semesters.

Students who have earned an ADT should seek advising in the major department during the first semester of attendance.

General Advising Information for Transfer Students
1. Before transfer, complete as many lower division requirements or electives for this major as possible.
2. The following courses are not required for admission, but are required for graduation. Students are strongly encouraged to complete these units before transfer, doing so will provide more flexibility in course selection after transfer.
   • a course in U.S. & California Government
   • a 2nd-semester course in written English composition

Transferring from institutions other than CCCs or CSUs
Review SF State’s lower division General Education requirements. Note that, as described below, the four basic skills courses required for admission meet A1, A2, A3, and B4 in the SF State GE pattern. Courses that fulfill the remaining areas of SF State’s lower division GE pattern are available at most two-year and four-year colleges and universities. Of the four required basic skills courses, a course in critical thinking (GE A3) may not be widely offered outside the CCC and CSU systems. Students should attempt to identify and take an appropriate course no later than the term of application to the CSU. To review more information about the A3 requirement, please visit http://bulletin.sfsu.edu/undergraduate-education/general-education/lower-division/#AAEL.

Identify and complete a 2nd-semester written English composition course before transfer. This is usually the next course after the typical “freshman comp” course, with a focus on writing, reading and critical
analytical skills for academic purposes, and developing skills in composing, revising, and the use of rhetorical strategies.

Waiting until after transfer to take a single course at SF State that meets both US and CA/local government requirements may be an appropriate option, particularly if transferring from outside of California.

All students must meet the transfer eligibility requirements outlined below for admission. For more information, visit the Undergraduate Admissions section.

- Complete 60 or more transferable semester units or 90 or more quarter units
- Earn a college grade point average of 2.00 or better in all transferable courses. Non-local area residents may be held to a higher GPA standard.
- Be in good standing at the last college or university attended
- Complete 30 semester units (45 quarter units) of general education, including four basic skills courses:
  - One course in oral communication (same as CSU GE area A1)
  - One course in written composition (same as CSU GE area A2)
  - One course in critical thinking (same as CSU GE area A3)
  - One course in mathematics or quantitative reasoning, with intermediate algebra as a prerequisite (same as CSU GE area B4)
- The four basic skills courses and a minimum of 60 transferable semester units (90 quarter units) must be completed by the spring semester prior to fall admission, or by the fall semester prior to spring admission. Earn a "C" or better grade in each basic skills course.