TO: The Academic Senate
FROM: Committee on Instruction and Curriculum (CIC)
SUBJECT: 16-17 CIC 42: Revision request for B.A. Biology
PURPOSE: Information to the Academic Senate
ACTION REQUESTED: That the Senate accept the information that the revision request for bachelors of arts in Biology has been approved by CIC.

BACKGROUND INFORMATION:
The Senate process for approving transformed degree programs for the semester calendar is defined by 14-15 CIC 36. The Committee discussed the B.A. in Biology at its November 28 meeting, which was attended by representatives of the Department: Donald Gailey, Michael Hedrick, and Caron Inouye. It was approved by CIC unanimously with the acknowledgement that some non-substantive changes may occur in the Catalog copy. The proposal may be viewed within Curriculog; the summary is attached as a PDF document per ExCom’s request.
B.A. Biological Science

2. Semester Conversion Request for Approval of Revision of the Undergraduate Degree Program/Major

General Catalog Information

***READ BEFORE YOU BEGIN***

Use this form to request a revision to your Undergraduate Degree Program/Major and its concentration(s). Note: If you have previously submitted this form, and you have additional concentrations to submit, PLEASE USE FORM 2C. Semester Conversion Request for Approval of New or Revised Undergraduate Concentration.

To change the title of your degree program, a narrative will need to be submitted to APGS for review by CIC and the state chancellor's office. Click here to submit your narrative.

To move an existing degree to online, complete form #7. Semester Conversion Request for Online/Hybrid Program Modification.

To elevate an option to a degree or change the degree type, a narrative will need to be submitted to APGS for review by CIC and the state chancellor's office, Click here to submit your narrative.

Turn on Help Text by clicking the Show Help Text icon above this section of the form.

Effective Term: Fall 2018

Catalog: 2018-2019

Select Shared Core unless otherwise instructed by APGS

Select SHARED CORE

*Program

Shared Core

Department:

Department of Biological Sciences
<table>
<thead>
<tr>
<th><strong>Full and exact title of Major including degree earned (see help text):</strong></th>
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<tbody>
<tr>
<td>B.A. Biological Science</td>
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<tr>
<th><strong>Has your program received transformation funding?</strong></th>
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<td>☐ Yes ☐ No</td>
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<th><strong>If the program received transformation funding, please summarize the transformative changes made:</strong></th>
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https://csueastbay.curriculog.com/proposal:4121/print
"The Department of Biological Sciences is one of the largest departments in the College of Science with nearly 900 majors; the department has a long history of commitment to hands-on learning and experience in biology through offering courses with laboratory sections." The major goal in transformation was a balance of these two statements, that is, meeting enrollment demands while turning out Bachelor’s students who are scientists and "know their biology." However, an unfortunate correlation with increased enrollments has been a suspected decline in learning outcome, especially in lab-based courses. Our resulting approach is a transformed, lab-based curriculum infused with teaching of the scientific method: hypothesis development and testing, critical thinking through analysis of data, discussion and scientific writing, with now built-in formal class time for these essential components of science that go far beyond just "working in the lab." We have accomplished this for the B.S. through the following.

creating a core curriculum that is a common requirement for all majors, and a choice of one of two areas of upper-division concentration.

The introductory year: Students will continue to meet in groups of 24 for one laboratory exercise a week, but now the lab section will meet a second time each week as a 2-hr activity for full application of the scientific method for the corresponding "wet lab" of the week and relating lecture. This will provide opportunity for assessing individual student learning outcome and advising as the course proceeds.

All majors will be required to take Genetics and Evolutionary Biology as a cohesive two-semester series. The courses will be upper-division with no community-college equivalency. Genetics and evolution together are the underlying principles of all biology; and this is now reflected in our core curriculum. With focus on small group experience, discussion/analysis, and development of computer skills with DNA databases and bioinformatics applications, the genetics course will have activity sections limited to 24 students, and will now be a closely linked prerequisite for Evolutionary Biology

The upper-division experience: Biology is a vast science today ranging from sub-cellular biochemistry to populations and ecosystems. Our previous BS curriculum had six option curricula to cover this vastness; they have varied immensely in enrollment, they have no stated core curriculum, and they present themselves as virtually impossible subjects for program assessment. One is the so-called "no-option option" General Biology. Rather than a focused and rigorous Biology degree, the General Option traditionally has had a number of "easier" service-course options. This has been
transformatively resolved by reducing the concentration choices to two general areas, each with upper-division pathways, and removal of the general option. We have created similar capstone courses in each pathway which will now facilitate assessment of program effectiveness. The Integrative Biology concentration will allow for two pathways, Ecology and Evolutionary Biology vs. Physiology. The Cell and Molecular Biology concentration will allow for a choice of three pathways: Cell and Molecular Biology, Microbiology and Biomedical Lab Sciences, and Forensics.

The department’s B.A. program has historically been poorly enrolled, with two vastly different options, the General and Biology Education options. The latter is rigorous and focused on producing K-12 teachers. The former is not rigorous and too often has become a degree escape route for marginal students in the B.S. program. By transformation, our B.A. program will now shine as a Biology Education degree only, with focus on developing well-trained teachers. We believe this will lead to increased enrollment.

By these transformations, the Biology BS and BA programs will more effectively meet current demands for the wide variety of jobs available to biology graduates, and can now be uniformly and effectively assessed through the undergraduate core, and through similar-structured senior-level capstone courses in each of the pathways.
Program Description

Biology is concerned with living matter in all its forms, responses, and interactions. It deals with the study of anything that has been or is alive: microbes, fungi, plants, "protists" and all animals, including humans. The science of biology includes a large number of highly integrated sub-disciplines such as microbiology, genetics, molecular biology, ecology, evolutionary biology, physiology, systematics, and behavior. Biologists must draw upon a wide variety of academic disciplines to make observations and form conclusions, and well-trained biologists have solid backgrounds in chemistry, mathematics, computer science, statistics, physics, and the humanities, as required by graduate programs and professional schools, to meet the demands of professions in the life sciences.

The Department of Biological Sciences offers a diversified curriculum in the life sciences. Courses are designed for biology majors with specific degree objectives, for students seeking applied technical training, and for non-major students with general interest in biological subjects. Undergraduate programs will prepare students for both graduate work and for a diversity of careers. Biology majors may enter specialized or general careers in life science and find themselves working in laboratories, offices, the field, administrative posts, academic institutions, industry, government agencies, private foundations, botanic gardens, wildlife preserves and zoos. Simply put, biologists study the living planet.

Student Learning Outcomes

Students graduating with a B.S. or B.A. in Biological Science from Cal State East Bay will be able to:

- explain core biological concepts, including evolutionary processes, structure-function relationships across all levels of biological organization, information flow, pathways and transformations of energy and matter in living systems, and the interactions and interconnectedness of living systems;
- apply quantitative reasoning to explain biological phenomena and to address biological problems;
- clearly communicate biological information in a variety of formats (written, oral, visual) using a style appropriate for the intended audience;
- apply methods of scientific inquiry by formulating testable hypotheses, collecting and analyzing data, and reporting conclusions;
- gather, interpret, and evaluate published scientific information.

Career Opportunities

In addition to becoming a Biologist with specialization in a given discipline of the biological sciences, career opportunities include:
Administrator
Biotechnologist
A range of professions in the human healthcare industry
Environmentalist
Researcher
Graduate student
Pharmacology student
Physical Therapy student
Science Education Specialist
Toxicologist
Veterinary assistant

Features

Classes are offered on the Hayward campus in well-equipped facilities, at the Moss Landing Marine Laboratories located in Monterey Bay (via participation in a CSU Consortium which allows degree credit for MLML course), and at field locations such as Garin Reserve adjacent to campus.

A concentration in Microbiology and Biomedical Laboratory Sciences is offered to qualify students for California hospital traineeships which lead to state licensing as medical technologists and clinical lab scientists.

Preparation

A student who has successfully completed an advanced placement course in biology in high school and has earned a score of "3," "4" or "5" on the Advanced Placement Examination will be granted 5 units of credit in place of BIOL 140B (but not 140A) for Biology majors; 4 units credit for BIOL 101 and BIOL 102 for non-majors.

Prerequisite courses for all Biology courses must be passed with a grade of "C-" or better. All requests for Grade Forgiveness are subject to space availability, with priority given to newly enrolled students.

Bachelor's Degree Requirements

For the B.S. degree in Biological Science, the student must select a concentration and a pathway of courses within that concentration. The Cell and Molecular Biology concentration has three upper-division pathways of curricular specialization: (1) the Cell and Molecular Biology pathway; (2) the Forensic Science pathway; and (3) the Microbiology and Biomedical Lab Sciences pathway. The Integrative Biology concentration has two upper-division pathways of curricular specialization: (1) the Ecology and Evolutionary Biology pathway and (2) the Physiology pathway. Both concentrations (and thus all pathways) have the same lower and upper division core of required classes.

The B.A. degree in Biological Science is offered with a single concentration in Biology Education.
Click here to see instructions before completing the following Major Requirements field.

B.A. in Biological Science with concentration in Biology Education

Total 77-79 units in the concentration, 118 total minimum units with G.E. for the degree; all courses are required with the exception of the capstone choice, see below.

Lower Division BIOL (10 units)
BIOL 140A Principles of Cell & Molecular Biology (5)
BIOL 140B Principles of Organismal Biology (5)

Lower Division outside the Department of Biological Sciences (28 units)
CHEM 111 General Chemistry I (5)
CHEM 112 General Chemistry II (5)
CHEM 230 Survey of Organic Chemistry (5)
GEOI 100 Earth Systems Science (4)
MATH 115 College Algebra (3)
MATH 120 Pre-calculus (3)
PHYS 115 Elementary Physics (3)

Upper Division BIOL (20 units)
BIOL 310 Genetic Analysis I (4)
BIOL 320 Evolutionary Biology (3)
BIOL 330 General Microbiology (5)
BIOL 350 Ecology (4)
BIOL 370 Animal Physiology (4)

Plus any upper division BIOL electives, including up to 2 units of independent study (6 units)

Upper Division Teacher Education and Statistics (10 units)
(Note: PHIL 371 will satisfy GE Area C4)
PHIL 371 Philosophy of Education (3)
SCI 308 Hands On Science Teaching (1)
TED 301 Introduction to Education (3)
STAT 303 Statistical Methods in Biology (3)

Capstone, choose one of the following (3-4 units)
BIOL 426 Advanced Molecular and Cell Biology (3)
BIOL 430 Microbial Physiology and Metabolism (3)
BIOL 469 Conservation Biology (4)
BIOL 488 Environmental Physiology (3)

**Total Units Required in the MAJOR Program**

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<th>Semester Based Program:</th>
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<td>90</td>
<td>77-78</td>
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**B.A. Programs**: Major requirements are a minimum of 24 units with at least 12 upper division units.

**B.S. Programs**: Major requirements are a minimum of 36 units with at least 18 upper division units.

Total Degree Units should not exceed **120 Semester Units** unless previously approved by Chancellor's Office for exemption.

See [Unit Calculator](https://csueastbay.curriculog.com) for assistance.
For the B.S. degree, the student must select an concentration and a pathway within that concentration. The Cell and Molecular Biology concentration has three upper-division pathways of curricular specialization: (1) the Cell and Molecular Biology pathway; (2) the Forensic Science pathway; and (3) the Microbiology and Biomedical Lab Sciences Pathway. The Integrative Biology Concentration has two upper-division pathways of curricular specialization: (1) the Ecology and Evolutionary Biology pathway and (2) the Physiology pathway. Both concentrations (and thus all pathways) have a common lower and upper division core of required courses.

The B.A. degree is offered with a single concentration in Biology Education.

Certificate in Foundational Level General Science

The Foundational Level General Science certificate program is designed for students who would like to teach middle school science or would like to become K-5 science specialists. Credentialed teachers who complete this program and pass the Science CSET I and II exams qualify for the Foundational-level Added Authorization in Science.

Candidates for this program should have or plan to obtain their Multiple Subject teaching credential or a Single Subject teaching credential in a subject other than a science discipline. Students who complete this program will be well prepared to teach science at the K-8 level, will have completed the State required Methods Courses in Single Subject Science and will have the content knowledge required to pass the Science CSET I and II exams. The certificate consists of 16 units.

Required Courses

- BIOL 301 Biology Connections (3)
- BIOL 302 Biology Connections Laboratory (1)
- CHEM 301 Chemistry Connections (3)
- CHEM 302 Chemistry Connections Laboratory (1)
- GEOL 301 Earth Science Connections (3)
- GEOL 302 Earth Science Connections Laboratory (1)
- PHYS 301 Physics Connections (3)
- PHYS 302 Physics Connections Laboratory (1)

If the program has a similar transfer model curriculum (TMC), please e-mail Kyle Burch, Articulation Officer, Academic Programs and Graduate Studies, to verify that the revised program meets the TMC requirements prior to submitting the program revision request form.
Is the major approved as a "similar" degree under the STAR Act (SB 1440)?*

- Yes
- No
- I'm not sure (Articulation Office will contact you)

If yes, explain how this modification will affect the "similar" degree agreement

Were any concentrations (options) discontinued?*

- Yes
- No

If yes, please list discontinued options. If no, please enter "N/A" or "not applicable."*

The overall plan for the B.A. Biological Science concentrations was simplified to one concentration: Biology Education.

This involved the discontinuance of the General Biology Option (the "no option" option).

If any quarter-system Option programs were discontinued, please complete form 8. Semester Conversion Request to Discontinue Quarter-System Programs.

Is this major approved as an online degree program?*

- Yes
- No

If no, is there any pathway in the revised degree that is more than 50% online?

- Yes (MUST complete the Request for Online/Hybrid Program Modification)
- No

Resource implications of
Relationship of Revised Program to requirements for teaching credentials, accreditation, and/or licensing, if any:

None

Consultation with other affected departments and programs:

The following department(s) has (have) been consulted and raised no objections:*

Did not consult any departments outside of my own.

The following department(s) has (have) been consulted and raised concerns:

Did not consult any departments outside of my own.

Attachments

Please scroll to the top of this form and select the Files icon to attach the following documents to your proposal:

Bachelor's Degree Roadmap
Curriculum Map 1 - PLOs to Courses
Curriculum Map 2 - PLOs to ILOs
Five Year Assessment Plan

Did you attach your Curriculum Maps, Five Year Assessment Plan or other supporting documents to this proposal?

Yes  No
### Catalog Item Types

<table>
<thead>
<tr>
<th>Degree Type*</th>
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<tbody>
<tr>
<td>Program Type*</td>
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Attachments for B.A. Biological Science

**Assessment_F ive-year-plan_Biology.pdf** (uploaded by Stephanie Matsuda, 8/1/2016 3:58 pm)

**Assessment_Curr-Map-2_Biology.pdf** (uploaded by Stephanie Matsuda, 8/1/2016 4:00 pm)

**Copy of Assessment_Curr-Map-1_BA-BS_Biology-2.xlsx** (uploaded by Stephanie Matsuda, 8/1/2016 4:03 pm)

**Copy of Roadmap_Biology_BA BioEduc.xlsx** (uploaded by Stephanie Matsuda, 8/1/2016 4:13 pm)

**Copy of Copy of Roadmap_Biology_BA BioEduc-1_APGS edits 8.26.16.xlsx** (uploaded by Stephanie Matsuda, 8/26/2016 11:10 am)
CIC approved this unanimously at its November 28 meeting. This is documented as 16-17 CIC 42.

The Committee recommended reordering the list of jobs in the Catalog copy.

Decision Summary for B.A. Biological Science

Committee on Instruction and Curriculum

Step Summary
This step requires 100% approval from all participants to move forward.

Participants

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<tr>
<th>Academic Senate</th>
<th>Totals</th>
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<tr>
<td>Sophie Rollins *</td>
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<th>CIC</th>
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<tr>
<td>CIC Nov. 28</td>
<td>MITCH WATNIK *</td>
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