COMMITTEE ON INSTRUCTION AND CURRICULUM

16-17 CIC 23
Monday, October 24, 2016

TO: The Academic Senate

FROM: Committee on Instruction and Curriculum (CIC)

SUBJECT: 16-17 CIC 23: Revision request for B.S. Chemistry

PURPOSE: Information to the Academic Senate

ACTION REQUESTED: That the Senate accept the information that the revision request for B.S. Chemistry 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.S. Chemistry program at its October 24 meeting, which was attended by representatives of the Department: Anne Kotchevar and Ann McPartland. It was approved by CIC unanimously with the acknowledgement that some non-substantive changes may occur in the Catalog copy, such as addition of numbers of units next to the classes. The proposal may be viewed within Curriculog; the summary is attached as a PDF document per ExCom’s request.
B.S. Chemistry

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

General Catalog Information

Select **Shared Core** unless otherwise instructed by APGS

- Select **SHARED CORE**
  - Program
  - Shared Core

Year: Fall 2018

Catalog: 2018-2019

**Notes:** If you want to move an existing degree program to online (i.e. 50% or more of the program can be completed online (a hybrid course counts as .50 online), elevate an option to a degree, or change the degree type, please e-mail Donna Wiley, Interim Associate Vice President, Academic Programs and Graduate Studies; and copy Sarah Aubert, Catalog and Curriculum Specialist, Academic Programs and Graduate Studies, for additional instructions as soon as possible.

Department: *Department of Chemistry and Biochemistry*

Full and exact title of Major including degree earned:* B.S. Chemistry

Has your program received transformation funding?*

- Yes
- No

If the program received transformation funding, please summarize the transformative changes made:
The BA Biochemistry and BA Chemistry degree programs have undergone conversion. The BS Biochemistry and BS Chemistry degree programs have undergone transformation.

The BS Chemistry degree program has undergone significant restructuring during the conversion to a semester conversion in order to maintain content and to fulfill the accreditation requirements of the American Chemical Society with regard to laboratory courses. Three specialized one quarter lab courses (Quantitative Analysis, Instrumental Analysis, and Inorganic Chemistry Lab) and two two quarter lab series (Physical Chemistry Lab and Environmental Chemistry) were reorganized into single semester lab courses without reducing the total laboratory hours required for accreditation and without increasing the total number of units beyond 120. In Quantitative Analysis and Inorganic Lab, the number of lab periods was increased (from 20 to 30) and new experiments were added. In Instrumental Analysis and Physical Chemistry Lab where the overall number of lab periods were decreased (from 20 to 15 for Instrumental Analysis and from 40 to 30 for Physical Chemistry Lab), some of the experimental techniques previously covered were redistributed among other courses in order to preserve the aggregate laboratory experience obtained in the degree. The number of lab hours in the elective Environmental Chemistry was also decreased from 20 to 15 and the lab experiments were restructured to maximum the students' time with modern instrumentation.

The BS Biochemistry degree program has also undergone substantial restructuring during the conversion to a semester conversion. The specialized Biochemistry Laboratories have been reorganized and expanded. The number of laboratory hours will be greater after semester conversion (from a total of 20 lab periods to 30 lab periods) and will run over the course of one year compared to the present two quarters. New experiments were added and with more time available, an effort was made to integrate some of the individual experiments into a larger project driven by a concrete question. The degree has also been made more rigorous by the requirement of more math units (10 semester units) and requiring calculus-based physics courses.

In addition, the program learning outcomes were modified, and new curriculum maps and assessment plans have been made for all of the degree programs.
Program Description

The Department of Chemistry and Biochemistry provides a strong education in chemistry and biochemistry that prepares its students to function and thrive in our society. The department attempts to increase the problem solving and critical thinking skills of all students. Non-science students learn about the scientific and chemical aspects of everyday life that allow them to understand issues related to the environment, energy production, disease prevention, and nutrition. Students of the sciences learn the fundamentals of chemistry that control the interactions of elements and molecules which form the building blocks in nature. Chemistry majors receive extensive instruction in predicting chemical reactivity. Building on an understanding of mathematics, physics, and biology, chemistry majors receive a background in the major disciplines of chemistry including inorganic, analytical, organic, physical, and biochemistry. Students learn the protocols and techniques for working safely with chemicals. The department recognizes the importance of the pursuit of new knowledge in the development of skilled scientists and productive members of society, and encourages its students to participate in research projects and cooperative educational opportunities.

The undergraduate programs offered by the department include: **Chemistry, B.S.**, **Biochemistry, B.S.**, **Chemistry, Bioanalytical and Forensics Concentration, B.S.**, **Chemistry, B.A.**, **Chemistry, Chemistry Education Concentration, B.A.**, **Biochemistry, B.A.**, **Biochemistry, Chemistry Education Concentration, B.A.**; and a **Chemistry Minor**. Descriptions of these programs and their requirements are listed below. (See the **Department of Chemistry and Biochemistry (Graduate)** for descriptions of the department's **Chemistry, M.S.** and M.S. Concentration in Biochemistry.)

The **Chemistry, B.S.** degree is approved by the American Chemical Society (ACS). A certified degree is a valuable credential that serves as national-level recognition for completing a rigorous academic chemistry curriculum in an ACS-approved department. The extra rigor of an ACS certified degree is valued by both potential employers and graduate schools.

Mission Statement

It is imperative that CSUEB chemistry students possess sufficient theoretical and practical training in chemistry and biochemistry so that they will be able to assume the significant technical responsibilities required by the chemical and biotechnology industries that will employ them. It is
the chemical and biotechnology industries that will employ them. It is important that our students are not only trained in chemistry (and biochemistry), but will become respected scientists and research technicians. In addition, it is important that students planning for entrance into Ph.D. programs or pre-professional programs are more than adequately prepared for entrance into these programs.

**Student Learning Outcomes**

Students graduating with a Bachelor’s degree in Chemistry or Biochemistry from Cal State East Bay will be able to:

1. Demonstrate knowledge in the various area of chemistry, including inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, and biochemistry.
2. Use quantitative reasoning to analyze and solve chemical problems and evaluate chemical data.
3. Work effectively and safely in a laboratory environment to perform experimental procedures and operate modern chemical/biochemical instruments.
4. Design, carry out, record and analyze the results of chemical experiments.
5. Communicate chemical or biochemical issues clearly.

**Career Opportunities**

Analytical Chemist  
Biotechnologist  
Biochemist  
Biophysicist  
Chemist  
Dietitian  
Environmental Chemist  
Food and Drug Inspector  
Forensic Chemist  
Geochemist  
Health Professional  
Materials Scientist  
Organic Chemist  
Perfumer  
Petrologist
Pharmacist
Pharmaceutical Chemist
Physical Chemist
Pollution Control
Quality Control Technician
Teacher
Water Purification Chemist

Features

Laboratory equipment and instruments in the Department of Chemistry and Biochemistry include a 500 MHz nuclear magnetic resonance (NMR) spectrometer, a capillary gas chromatograph with mass-spectral detection (GC/MS), Fourier-transform infrared spectrophotometers (FTIR), an inductive coupled plasma optical emission spectrometer (ICP-OES), high performance liquid chromatograph (HPLC), a fast protein liquid chromatograph (FPLC), a fluorescence spectrometer, a diode-array ultraviolet-visible spectrophotometer, and microwave synthesizers. A molecular modeling facility is also available for instruction and research.

The Alchemist Club, a student affiliate of the American Chemical Society, is available to students majoring in Chemistry. They are active in many aspects of the department, participate in fund-raising for special projects, and take interesting field trips to local industries.

Preparation and Prerequisites

Prerequisite courses for all chemistry courses must be passed with a grade of "C-" or better. Requests for Grade Forgiveness will be allowed only on a space-available basis.

Other Degree Requirements

In addition to major requirements, every student must also complete the University requirements for graduation which are described in the Baccalaureate Degree Requirements chapter in this catalog. These include the General Education requirements; the University Writing Skills Requirement; and the residence, unit, and grade point average requirements.
**Please read before completing Major Requirements Section**

**Instructions:**

Start with the **View Curriculum Courses** icon directly beneath the Major Requirements field. Select the **Add Courses** button to enter each individual course that will be used in your Major Program. (Optional: Include the Course Units in the Course Title (name) field for ease of review by campus committees). Next select the **View Curriculum Schema** icon (to the left of the Curriculum Courses icon). Select **Add Core** to build the headers and requirements for your catalog page. i.e. add headers for Prerequisites, Core Requirements, Electives, Capstone. (If you have a concentration(s), add a core titled Concentrations and list only the total concentration units. You do not need to list each individual concentration.) **Please remember to include total units in core headers.**

Preview your catalog chapter by selecting the **Preview Curriculum** icon.

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**Major Requirements:**

**B.S. Chemistry (ACS Certified Program)**

The Bachelor of Science degree, major in Chemistry, is designed to prepare students for graduate school in Chemistry and related fields and for industrial employment which involves research or a high degree of technical proficiency. It is intended for students desiring the highest degree of specialization. Please consult an advisor in your major department for clarification and interpretation of your major requirements. The major consists of 72-74 units; the B.S. degree requires a total of 120 units.

**Lower Division (39 units)**

- CHEM 111 General Chemistry I
- CHEM 112 General Chemistry II
- CHEM 220 Quantitative Analysis
- PHYS 135 Physics for Scientists and Engineers I
- PHYS 136 Physics for Scientists and Engineers II
- PHYS 137 Physics for Scientists and Engineers III
- MATH 130 Calculus I
- MATH 131 Calculus II
- MATH 210 Linear Algebra with Differential Equations
- MATH 230 Calculus III
Note: Students who have selected the Bioanalytical and Forensics concentration are not required to take PHYS 137 and MATH 210.

Upper Division (30 units)

CHEM 331 Organic Chemistry I  
CHEM 332 Organic Chemistry II  
CHEM 340 Survey of Biochemistry  
CHEM 351 Physical Chemistry I  
CHEM 352 Physical Chemistry II  
CHEM 355 Physical Chemistry Laboratory  
CHEM 410 Advanced Inorganic Chemistry  
CHEM 415 Inorganic Chemistry Laboratory  
CHEM 420 Instrumental Analysis

Note: Students who have selected the Bioanalytical and Forensics concentration are not required to take CHEM 355, CHEM 410 and CHEM 415.

Elective (3 units)

Choose a minimum of three units from the following:

CHEM 425 Environmental Chemistry  
CHEM 430 Advanced Organic Chemistry  
CHEM 450 Classical and Statistical Thermodynamics

Note: Students who have selected the Bioanalytical and Forensics concentration are not required to take an elective course.

(Optional) Bioanalytical and Forensics Concentration (20 units)

The Bachelor of Science degree, major in Chemistry with a Bioanalytical and Forensics concentration, is designed to prepare students for careers as bioanalytical or forensic chemists.

BIOL 140B Principles of Organismal Biology  
BIOL 140A Principles of Cell and Molecular Biology
To revise an existing concentration (formerly option) or create a new concentration, select form 3a. Semester Conversion Request for Approval of New or Revised Undergraduate Concentration.

**Total Units Required**

<table>
<thead>
<tr>
<th>Quarter Based Program:*</th>
<th>180</th>
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<tbody>
<tr>
<td>Semester Based Program:*</td>
<td>120</td>
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</table>

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

**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.

See [Unit Calculator](https://csueastbay.curriculog.com/proposal:1191/print) for assistance.

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.

If the major is 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 explain below. If no, please enter "N/A" or "not applicable."*

N/A

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 ☐ No ☐

Resource implications of the proposed revision, if any:

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

N/A

Consultation with other affected departments and programs:

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

* All affected academic departments and programs at CSUEB were consulted and there were no objections

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

none

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

Degree Type*  Bachelor of Science

Program Type*  Bachelor
Attachments for B.S. Chemistry

BA-BS Chem Biochem curr-map-PLO-to-ILO.docx (uploaded by Anne Kotchevar, 3/1/2016 3:29 pm)

BS Chemistry curr-map-course-to-PLO.docx (uploaded by Anne Kotchevar, 3/1/2016 3:29 pm)

BS Chemistry five-year-plan assessment.docx (uploaded by Anne Kotchevar, 3/1/2016 3:29 pm)

BS Chemistry roadmap.xlsx (uploaded by Anne Kotchevar, 5/6/2016 10:02 am)

BS Chemistry conc Bioanalytical Forensics curr-map-course-to-PLO-1.pdf (uploaded by Stephanie Matsuda, 5/13/2016 3:02 pm)

BS Chemistry conc Bioanalytical Forensics five-year-plan assessment-1.pdf (uploaded by Stephanie Matsuda, 5/13/2016 3:03 pm)

BS Chemistry conc Bioanalytical Forensics roadmap.pdf (uploaded by Stephanie Matsuda, 5/13/2016 3:06 pm)