

BS IN BIOCHEMISTRY



SACRAMENTO STATE

In Workflow

1. CHEM Committee Chair (rdixon@csus.edu)
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Approval Path

1. 2025-10-09T02:50:24Z
Roy Dixon (rdixon): Approved for CHEM Committee Chair
2. 2025-10-14T22:05:22Z
Thomas Savage (tjsavage): Approved for CHEM Chair
3. 2025-10-15T23:12:12Z
Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. 2025-10-15T23:24:14Z
Chris Taylor (ctaylor): Approved for NSM Dean

History

1. May 2, 2018 by clmig-jwehrheim
2. Aug 13, 2018 by 212408496
3. Oct 2, 2018 by 212408496
4. Oct 7, 2020 by Benjamin Gherman (ghermanb)
5. Apr 20, 2021 by 220267334
6. Apr 29, 2021 by Janett Torset (torsetj)

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Changes proposed by: Linda Roberts (101010256)

Academic Group: (College)

Natural Sciences & Mathematics

Academic Organization: (Department)

Chemistry

Catalog Year Effective:

2026-2027 Catalog

Individual(s) primarily responsible for drafting the proposed degree major program:

Name (First Last)	Email	Phone 999-999-9999
Linda Roberts	robertslm@csus.edu	916-278-3892

Type of Program:

Major

Program Change Type:

Non-Substantive

Delivery Format:

Fully Face to Face

Title of the Program:

BS in Biochemistry

Designation: (degree terminology)

Bachelor of Science

Briefly describe the program proposal (new or change) and provide a justification:

We are proposing to change the requirement of two upper division labs, Chem 125 and Chem 141, to requiring only one of these. The other course will become a chemistry elective (lecture or lab). This change increases student elective choice, providing more flexibility in aligning the degree with intended career paths. This change further reduces enrollment pressure in small upper division lab courses and reduces operational costs associated with laboratory courses. We are also adding recently developed courses in chemistry (CHEM 134 - Mass Spectrometry, CHEM 167 - Biochemistry of Aging) and physics (PHYS 172 - Biological Physics) to the list of upper division electives.

University Learning Goals**Undergraduate Learning Goals:**

Competence in the disciplines
 Knowledge of human cultures and the physical and natural world
 Intellectual and practical skills
 Integrative learning

Program Learning Outcomes**Program Learning Outcomes****Learning Outcome**

PLO 1: Student demonstrates knowledge of multiple laboratory techniques including safe operation of instrumentation and safe handling and disposal of hazardous materials.

PLO 2: Student demonstrates ability to obtain and evaluate information from a variety of scientific sources. Student demonstrates knowledge of different forms of plagiarism and how to avoid these.

PLO 3: Student demonstrates oral and written communication skills related to presenting contemporary scientific research in chemistry, including goals, background, methods, data, and conclusions.

PLO 4: Student demonstrates ability to comprehend and solve chemical problems using the appropriate quantitative techniques.

PLO 5: Student demonstrates ability to describe and apply biochemistry and chemistry knowledge and skills.

Learning Outcomes Display

Course Code	PLO 1
BIO 1	
BIO 2	
CHEM 1A	
CHEM 1B	
CHEM 24	
CHEM 25	
CHEM 31	
MATH 30	
MATH 31	

PHYS 5A	
PHYS 5B	
PHYS 11A	
PHYS 11B	
PHYS 11C	
BIO 184	
CHEM 124	
CHEM 125	
CHEM 141	
CHEM 142	
CHEM 160A	
CHEM 160B	
CHEM 162	
CHEM 164	
CHEM 110	
CHEM 126	
CHEM 128	
CHEM 133	
CHEM 134	
CHEM 145	
CHEM 167	
CHEM 198	
CHEM 250	
CHEM 260	
CHEM 261	
PHYS 172	
BIO 121	
BIO 139	
BIO 144	
BIO 149A	
BIO 149B	
BIO 180	
BIO 220	
BIO 222	

Will this program be required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?

No

Do these changes impact the degree roadmap?

Yes

Please attach the updated roadmap:

BS Biochemistry Road Map for Form B.pdf

Briefly describe the change:

Replace one of two required upper division labs in physical and organic chemistry with a lecture elective course. Update elective choices to reflect new courses in chemistry and physics.

Catalog Description:**Units required for Major: 81-85****Total units required for BS: 120****Program Description**

The Bachelor of Science degrees are recommended for students intending to pursue graduate work in Chemistry or Biochemistry or those desiring a strong technical background for work in the chemical or biotechnology industry or other highly technical areas.

Safety

Due to the potential hazards some chemicals may present, safety is an essential element of all Chemistry laboratory classes, including independent research. All students must adhere to the Department of Chemistry Laboratory Safety Policies (<https://www.csus.edu/college/natural-sciences-mathematics/internal/safety/>). Failure to adhere to the Safety Policies may constitute grounds for withdrawal from a course and/or dismissal from the program.

Advising

The Department believes advising of students is an important function. Members of the Chemistry Department who have a strong interest in advising have been selected to serve as advisors for students wishing to major in chemistry. Each represents a particular area of chemistry: analytical, inorganic, biochemistry, organic, and physical. Each Chemistry major will be assigned to one of these advisors when entering the Chemistry Department, coordinated to the area of each student's expressed interest.

Admission Requirements: Course prerequisites and other criteria for admission of students to the degree major program, and for their continuation in it.

Prerequisite Requirements

When enrolling in a course, it is required that the student will have met the specific prerequisites listed. A course listed as a prerequisite may have its own set of prerequisites. All must be met prior to enrolling in a chemistry course. Students not meeting the prerequisite requirements for a course will be administratively removed from the class.

Minimum Grade Requirements

In all courses required for the Chemistry major and minor, a minimum grade of "C-" must be earned with the exception of CHEM 1A which requires a grade of C or better. A minimum grade of "C-" is required in all prerequisite courses with the exception of CHEM 1A which requires a grade of C or better to meet the prerequisite requirement for CHEM 1B if a student has not achieved a "C-" in all prerequisite courses for a particular chemistry course, the instructor of the course will administratively remove the student from class.

Transfer Majors and Minors

Transfer students majoring in Chemistry must complete at least three of the required courses in chemistry while fulfilling the residence requirements of California State University, Sacramento. Transfer students seeking a minor in Chemistry must complete at least one upper division chemistry course at the University.

Note: Students graduating with a Bachelor of Science Degree in Biochemistry will not be subject to the University's Foreign Language Graduation Requirement. Students who change major may be subject to the University's Foreign Language Graduation Requirement.

As defined by policy <http://www.csus.edu/umannual/acadaff/fsm00010.htm>, a change in units constitutes a substantive change to the program. If your changes constitute a substantive change, please refer back to the "Program Change Type" field above to ensure that "Substantive" is selected.

Program Requirements: (If new courses are being created as part of a new program, it will be useful to propose courses first.)

Program Requirements

Code	Title	Units
Required Lower Division Courses (46-50 Units)		
BIO 1	Biodiversity, Evolution and Ecology ¹	5
BIO 2	Cells, Molecules and Genes	5
CHEM 1A	General Chemistry I ^{1,2}	5
CHEM 1B	General Chemistry II	5
CHEM 24	Organic Chemistry Lecture I	3

CHEM 25	Organic Chemistry Laboratory	3
CHEM 31	Quantitative Analysis	4
MATH 30	Calculus I ¹	4
MATH 31	Calculus II	4
Select one of the following sequences:		8 - 12
PHYS 5A & PHYS 5B	General Physics: Mechanics, Heat, Sound General Physics: Light, Electricity and Magnetism, Modern Physics	
PHYS 11A & PHYS 11B & PHYS 11C	General Physics: Mechanics General Physics: Heat, Light, Sound, Modern Physics General Physics: Electricity and Magnetism	
Required Upper Division Courses (26 Units)		
BIO 184	General Genetics	4
CHEM 124	Organic Chemistry Lecture II	3
Select one of the following:		3
CHEM 125	Advanced Organic Chemistry Laboratory	
CHEM 141	Physical Chemistry Laboratory	
CHEM 142	Introduction to Physical Chemistry	4
CHEM 160A	Structure and Function of Biological Molecules	3
CHEM 160B	Metabolism and Regulation of Biological Systems	3
CHEM 162	General Biochemistry Laboratory	3
CHEM 164	Advanced Biochemistry Laboratory	3
Upper Division Elective Courses (9 Units)		
Select 9 units: Include 3 units of CHEM, 3 units of BIO, and 3 additional units from the courses listed below.		9
CHEM 110	Inorganic Chemistry Lecture	
CHEM 125	Advanced Organic Chemistry Laboratory	
CHEM 126	Physical Organic Chemistry	
CHEM 128	Organic Synthesis	
CHEM 133	Chemical Instrumentation	
CHEM 134	Principles and Applications of Mass Spectrometry	
CHEM 141	Physical Chemistry Laboratory	
CHEM 145	Applications of Computational Chemistry	
CHEM 167	Biochemistry of Aging	
CHEM 198	Senior Research	
CHEM 250	Selected Topics in Chemistry	
CHEM 260	Protein Biochemistry	
CHEM 261	Nucleic Acid Chemistry	
PHYS 172	Biological Physics	
BIO 121	Molecular Cell Biology	
BIO 139	General Microbiology	
BIO 144	Pathogenic Bacteriology	
BIO 149A	Immunology	
BIO 149B	Immunology and Serology Laboratory	
BIO 180	Molecular Biology Research Experience	
BIO 220	Introduction to Scientific Inquiry 	
BIO 222	Molecular Biology	

Total Units **81-85**

¹ Course also satisfies General Education (GE)/Graduation Requirement.

² Passing a placement exam or obtaining a passing grade of "C" or better in CHEM 4 is required to enroll in CHEM 1A.

General Education Requirements ¹

Code	Title	Units
Area A: Basic Subjects (9 Units)		
A1 - Oral Communication		3
A2 - Written Communication		3
A3 - Critical Thinking		3

Area B: Physical Universe and Its Life Forms (3 Units)

B1 - Physical Science ²	0
B2 - Life Forms ²	0
B3 - Lab (Note: Lab experience to be taken with one of the following: B1, B2 or B5) ²	0
B4 - Math Concepts ²	0
B5 - Additional Course (Any B to reach 12 units) - Take upper-division course to complete Area & upper division requirements.	3

Area C: Arts and Humanities (12 Units)

C1 - Arts	3
C2 - Humanities	3
C1/C2 - Area C Course	3
C1/C2 - Area C Course - Take upper-division course to complete Area & upper division requirements.	3

Area D: The Individual and Society (9 Units)

Area D Course	3
Area D Course	3
Area D Course - Take upper-division course to complete Area & upper division requirements.	3

Area E: Understanding Personal Development (3 Units)

Area E Course	3
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Area F: Ethnic Studies (3 Units)

Area F Course	3
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Total Units	39
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¹ To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (<https://catalog.csus.edu/colleges/academic-affairs/general-education/>).

Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (<http://www.csus.edu/acad/>), by phone (916) 278-1000, or email (advising@csus.edu).

² Required in Major; also satisfies GE.

Graduation Requirements ¹

Code	Title	Units
Graduation Requirements (required by CSU) (9 Units)		
American Institutions: U.S. History		3
American Institutions: U.S. Constitution & CA Government		3
Writing Intensive (WI)		3
Graduation Requirements (required by Sacramento State) (6 Units)		
English Composition II		3
Race and Ethnicity in American Society (RE)		3
Foreign Language Proficiency Requirement ²		0

¹ To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (<https://catalog.csus.edu/colleges/academic-affairs/general-education/>).

Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (<http://www.csus.edu/acad/>), by phone (916) 278-1000, or email (advising@csus.edu).

² If not satisfied before entering Sacramento State, it may be satisfied in General Education Area C2 (Humanities). "C- or better required." The alternative methods for satisfying the Foreign Language Proficiency Requirement are described here: <https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html>

Note: Students with a declared major of BS in Biochemistry are exempt from the Foreign Language Graduation Requirement.

Fiscal Impact to Change an Existing Program

Indicate programmatic or fiscal impact which this change will have on other academic units' programs, and describe the consultation that has occurred with affected units:

The only change that impacts another unit is the inclusion of PHYS 172 - Biological Physics - to the list of upper division electives.

Attach a copy of correspondence with these units:

Physics consultation.pdf

Provide a fiscal analysis of the proposed changes:

Annual reduction of 10.0 WTU and \$2000 in O/E costs. Please see attached file for detailed cost analysis.

How will the above changes be accommodated within the department/College existing fiscal resources?

N/A - no new resources needed.

Will the proposed changes require additional resources?

No

What additional space, equipment, operating expenses, library, computer, or media resources, clerical/technical support, or other resources will be needed?

None

Estimate the cost and indicate how these resource needs will be accommodated:

N/A

Please attach any additional files not requested above:

BS Biochemistry Program Change Cost Analysis.docx

Key: 205