# BS IN BIOCHEMISTRY

## In Workflow

1. CHEM Committee Chair (tjsavage@csus.edu)
2. CHEM Chair (rdixon@csus.edu)
3. NSM College Committee Chair (tsk@csus.edu)
4. NSM Dean (datwyler@csus.edu)
5. Academic Services (torsetj@csus.edu;%20212408496@csus.edu;%20cnewsome@skymail.csus.edu)
6. Senate Curriculum Subcommittee Chair (curriculum@csus.edu)
7. Dean of Undergraduate (james.german@csus.edu;%20celena.showers@csus.edu)
8. Dean of Graduate (cnewsome@skymail.csus.edu)
9. Catalog Editor (212408496@csus.edu;%20torsetj@csus.edu;%20cnewsome@skymail.csus.edu)
10. Registrar's Office (wlindsey@csus.edu)

## Approval Path

1. Tue, 19 Nov 2019 22:28:42 GMT
   Benjamin Gherman (ghermanb): Approved for CHEM Committee Chair
2. Fri, 31 Jan 2020 03:56:43 GMT
   Roy Dixon (rdixon): Rollback to CHEM Committee Chair for CHEM Chair
3. Tue, 25 Feb 2020 20:14:23 GMT
   Benjamin Gherman (ghermanb): Approved for CHEM Committee Chair
4. Tue, 25 Feb 2020 22:08:36 GMT
   Roy Dixon (rdixon): Approved for CHEM Chair
5. Wed, 04 Mar 2020 23:31:02 GMT
   Thomas Krabacher (tsk): Approved for NSM College Committee Chair
6. Tue, 10 Mar 2020 16:38:18 GMT
   Shannon Datwyler (datwyler): Approved for NSM Dean
7. Wed, 08 Apr 2020 18:26:56 GMT
   Janett Torset (torsetj): Approved for Academic Services

## History

1. May 2, 2018 by clmig-jwehrheim
2. Aug 13, 2018 by 212408496
3. Oct 2, 2018 by 212408496

Date Submitted:Wed, 13 Nov 2019 23:27:04 GMT

## Viewing:BS in Biochemistry

## Last approved:Tue, 02 Oct 2018 20:36:27 GMT

## Last edit:Wed, 19 Feb 2020 22:29:48 GMT

Changes proposed by: Benjamin Gherman (102085943)

**Academic Group: (College)**

Natural Sciences & Mathematics

**Academic Organization: (Department)**

Chemistry

**Catalog Year Effective:**

2021-2022 Catalog

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

| Name (First Last) | Email | Phone 999-999-9999 |
|---|---|---|
| Benjamin Gherman | ghermanb@csus.edu | 916-278-6600 |

**Type of Program Proposal:**

Major

**Program Change Type:**

Non-Substantive

**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:**

• Updating list of elective courses to include Chem 145 (which has existed as a course for ~8 years and is, for example, listed as an elective for the BS in Chemistry program) and Chem 126 (which was recently approved for the Spring 2019 catalog).
• Removing language about contact lenses from the program description. Safety information is now specified in department policy, which is referred to in the catalog (just before where the contact lenses information was). State law has also changed regarding wearing contact lenses in chemistry labs.
• The URL for "Laboratory Safety Policies" within the Safety section of the program description has been updated (to match the new URL after the university website update in 2019).

**Objectives of the degree program:**

To prepare students to pursue graduate work in Biochemistry or to prepare students with a strong technical background for work in the chemical or biotechnology industry or other highly technical areas.

## University Learning Goals

**Undergraduate Learning Goals:**

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

**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 Smart Planner roadmap?**

No

**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 ChemistryLaboratory Safety Policies (https://www.csus.edu/college/natural-sciences-mathematics/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 policyhttp://www.csus.edu/umanual/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<br>& PHYS 5B | General Physics: Mechanics, Heat, Sound<br>General Physics: Light, Electricity and Magnetism, Modern Physics | |
| PHYS 11A<br>& PHYS 11B<br>& PHYS 11C | General Physics: Mechanics<br>General Physics: Heat, Light, Sound, Modern Physics<br>General Physics: Electricity and Magnetism | |
| **Required Upper Division Courses (29 Units)** | | |
| BIO 184 | General Genetics | 4 |
| CHEM 124 | Organic Chemistry Lecture II | 3 |
| CHEM 125 | Advanced Organic Chemistry Laboratory | 3 |
| CHEM 141 | Physical Chemistry Laboratory | 3 |
| 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 (6 Units)** | | |
| Select 3 units of Chemistry from approved list: | | 3 |
| CHEM 110 | Inorganic Chemistry Lecture | |
| CHEM 126 | Physical Organic Chemistry | |
| CHEM 128 | Organic Synthesis | |
| CHEM 133 | Chemical Instrumentation | |
| CHEM 145 | Applications of Computational Chemistry | |
| CHEM 198 | Senior Research | |
| CHEM 250 | Selected Topics in Chemistry | |
| CHEM 260 | Protein Biochemistry | |
| CHEM 261 | Nucleic Acid Chemistry | |
| Select 3 units of Biological Sciences from approved list: | | 3 |
| BIO 121 | Molecular Cell Biology | |
| BIO 139 | General Microbiology | |

| | | |
|---|---|---|
| BIO 144 | Pathogenic Bacteriology | |
| BIO 149A | Immunology | |
| BIO 149B | Immunology and Serology Laboratory | |
| BIO 180 | Advanced Molecular Biology | |
| 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 inCHEM 4is required to enroll inCHEM 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 (12 Units)** | | |
| Area D Course | | 3 |
| 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 |
| Total Units | | 39 |

[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 (http://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 (http://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/wll/flgr/
**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:**

None

**Provide a fiscal analysis of the proposed changes:**

None

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

None

**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

**Reviewer Comments:**

**Roy Dixon (rdixon) (Fri, 31 Jan 2020 03:56:43 GMT):**Rollback: To make additional approved changes

Key: 205