

BLENDED BS/MS IN BIOCHEMISTRY



SACRAMENTO STATE

In Workflow

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Approval Path

1. 2025-11-10T03:25:01Z
Roy Dixon (rdixon): Approved for CHEM Committee Chair
2. 2025-11-13T19:21:33Z
Thomas Savage (tjsavage): Approved for CHEM Chair
3. 2025-11-19T23:56:02Z
Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. 2025-11-24T17:29:29Z
Chris Taylor (ctaylor): Approved for NSM Dean

New Program Proposal

Date Submitted: 2025-10-24T17:25:06Z

Viewing: Blended BS/MS in Biochemistry

Last edit: 2025-11-05T23:02:21Z

Changes proposed by: Johannes Bauer (223000388)

Academic Group: (College)

Natural Sciences & Mathematics

Academic Organization: (Department)

Chemistry

Catalog Year Effective:

2026-2027 Catalog

NOTE: This degree major program will be subject to program review evaluation within six years after implementation.

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

Name (First Last)	Email	Phone 999-999-9999
Johannes Bauer	j.bauer@csus.edu	91627864635

Academic Master Plan Projection**Has this degree been approved for inclusion in the Academic Master Plan?**

Yes

Attach Projected Degree Proposal form

Sacramento-cap-2025.docx

New degree major proposals must receive prior approval for inclusion in the Academic Master Plan before a New Program proposal can be submitted to Workflow. Submissions to the AMP can be made through the Miscellaneous Request form.

Type of Program:

Major

Is this a pilot program?

No

Delivery Format:

Fully Face to Face

Does this major plan to include any formal options, concentrations, or special emphases?

No

Title of the Program:

Blended BS/MS in Biochemistry

Designation: (degree terminology)

Blended BS/MS

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

This program proposal combines the existing BS and MS programs in Biochemistry and Chemistry (Biochemistry), respectively, by allowing undergrads to double-count 9 units towards both degrees.

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

Graduate (Masters) Learning Goals:

Disciplinary knowledge
 Communication
 Critical thinking/analysis
 Information literacy
 Professionalism
 Research (optional)

Program Learning Outcomes

Program Learning Outcomes

Learning Outcome

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

- Student demonstrates oral and written communication skills related to presenting contemporary scientific research in chemistry, including goals, background, methods, data, and conclusions.
- Student demonstrates ability to analyze original research data and to synthesize results and conclusions with regard to the relevant biochemistry and chemistry research literature.
- 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.
- Student demonstrates knowledge of safety practices and handling and disposal of hazardous materials in the area of the thesis research.

Learning Outcomes Display

Course Code	PLO 1
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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

Please attach a Comprehensive Program Assessment Plan

NEW Blended-BS-Matrix-LO-Assessment.docx

Please attach a Curriculum Map Matrix

Blended-MS-Matrix-LO-Assessment.docx

Please attach a five-year budget projection

five year budget.docx

Catalog Description:

Program Description

The Blended BS/MS program in Biochemistry provides an accelerated route to a graduate degree through the simultaneous pursuit of both Bachelor's and Master's degrees. Students in the blended program can progress from undergraduate to graduate status without applying for admission through the Office of Graduate Studies, thus allowing highly motivated students to complete both the BS and MS programs in as little as five years.

Students who successfully complete the program will have an advantage in employment applications and admission into competitive PhD programs.

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

Admission Requirements

Students majoring in BS Biochemistry will be eligible to apply to the program if they meet the following criteria:

- Must have completed 60 units of coursework, and no more than 90
- Must have a minimum 3.0 GPA
- Must have CHEM124 completed
- Must have identified a research advisor, who must be one of the two writers of a letter of recommendation

Application Procedures

Students interested in applying to the Blended BS/MS Program should follow the outlined procedure:

Students must apply during a semester in which they have accumulated 60 units, but before they have completed 90 units.

Applicants do not need to pay the graduate program application fee.

Students must complete the departmental application form by the deadline date stated therein, which usually will be the last Friday of the Winter Intersession.

Applications will be submitted to the Chemistry Graduate Committee, which will competitively review and rank all applications.

If a student is accepted into the program, the department will notify the Registrar's Office and the Office of Graduate Studies.

Advancing to MS status

Upon completion of 120 units that count toward satisfying the bachelor's degree requirements in the blended program, the student will need to apply to change to graduate status. The student must complete the departmental transition to Graduate Status Form by week 5 of the semester during which the requirements for the undergraduate degree will be completed.

Students must maintain their minimum 3.0 GPA in order to advance to MS status.

Upon completion of 120 units that count toward satisfying the bachelor's degree requirements in the blended program, the student will need to apply to change to graduate status.

Opt-Out Option

Students who wish to opt out after completing all other BS major requirements except the 9 units of MS electives may do so, and the graduate courses will count as electives required in the normal undergraduate program. The total number of units taken for the BS degree will be the same (120 units) as for students who are not in the blended program.

Proficiency Examinations

All new graduate students must take two proficiency exams, in organic and physical chemistry, administered at the beginning of each semester. A passing score on either exam is a score of 50% or higher. The respective proficiency exams will be waived for students in the Blended Program if CHEM124 or CHEM142 was passed with a B- or better.

Research/MS Thesis

All MS students are required to complete a thesis involving original research. The research may be conducted on campus with a chemistry faculty member or at an employer's work site, provided that the work involves producing a new contribution to the field of Biochemistry.

In order to achieve a timely completion of the Blended Program, students are encouraged to identify a research advisor to begin research early in their career at Sacramento State, preferably no later than their sophomore year.

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

The blended program allows students to double count up to 9 units of graduate level courses both as electives for the B.S. degree and core courses for the M.S. degree, effectively decreasing the summed unit requirements for both degrees.

Students in the blended program should contact their academic advisor and closely follow the provided academic course map to aid them in their semester-to-semester course selection and to ensure completion of the program in the envisioned time frame.

The total number of required units for the Blended BS/MS program in Biochemistry is 141. Variable units are listed due to variable culminating requirement units.

BS Biochemistry

Program Requirements

Program Requirements

Course List

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 (29 Units)		
BIO 184	General Genetics	4
CHEM 124	Organic Chemistry Lecture II	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 ¹	3

CHEM 164	Advanced Biochemistry Laboratory	3
Select one of the following:		
CHEM 125	Advanced Organic Chemistry Laboratory ¹	3
CHEM 141	Physical Chemistry 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.

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	
BIO224\$	Genomics, Proteomics, and Bioinformatics	
BIO 227\$	Stem Cell Biology and Manufacturing Practices	
BIO 285\$	Topics in 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.

\$ CHEM260 or CHEM261 may be used to fulfill the Upper Division Chemistry elective and be double-counted towards the fulfillment of the MS course requirements

§ BIO222, 224, 227, 285 may be used to fulfill the Upper Division Biological Sciences elective and be double-counted towards the fulfillment of the MS course requirements

General Education Requirements ¹

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.

General Education/Graduation Requirements Checklist General Units

Education requirements cover a breadth of areas spanning 1.

English Communication, 2. Mathematical Concepts & Quantitative Reasoning, 3. Arts & Humanities, 4. Social & Behavioral Sciences, 5. Physical & Biological Sciences, and 6. Ethnic Studies.

For a list of courses that satisfy each Area and Requirement, please see the University Catalog.

General Education Requirements:	43
Lower Division: A total of 34 units of General Education Courses must be taken at the lower-division level (courses numbered 1-99) covering Areas 1, 2, 3, 4, 5, and 6.	34
Upper Division: A total of 9 units of General Education Courses must be taken at the upper-division level (courses numbered 100-199) from Areas 3, 4, and 5 or 2. Upper Division GE courses must be taken within the CSU.	9
GE Area 1. English Communication: 9 Lower Division Units	9
1A. English Composition (C- or better required)	3
1B. Critical Thinking (C- or better required)	3
1C. Oral Communication (C- or better required)	3
GE Area 2. Mathematical Concepts & Quantitative Reasoning: 3 Lower Division Units and up to 3 Upper Division Units	3
2. Mathematics/Quantitative Reasoning (C- or better required)	3
GE Area 3. Arts & Humanities: 6 Lower Division Units and 3 Upper Division Units	6
3A. Arts	3
3B. Humanities (3B courses may also satisfy the Foreign Language Graduation Requirement)	3
GE Area 4. Social & Behavioral Sciences: 6 Lower Division Units and 3 Upper Division Units.	6
• Area 4 courses must be taken in 2 separate disciplines (e.g., ANTH, ECON, ETHN, HIST, RPTA, etc.).	
• Up to 3 units of Area 4 courses may also satisfy CSU American Institutions Graduation Requirements in US History, the US Constitution and California Government.	
4. Any Area 4 Course	3
4. Any Area 4 Course	3
GE Area 5. Physical & Biological Sciences: 7 Lower Division Units and up to 3 Upper Division Units	7
5A. Physical Science	3
5B. Biological Science	3
5C. Laboratory (NOTE: May be embedded in 5A or 5B course, as long as 7 units met for lower division Subject Area 5.)	1
GE Area 6. Ethnic Studies: 3 Lower Division Units	3
6. Any Area 6 Course	3
Upper Division GE	9
Area 3. Any Upper Division Area 3 course	3
Area 4. Any Upper Division Area 4 course	3
Area 2 or 5. Any Upper Division Area 2 or 5 course	3
Graduation Requirements:	
Minimum 2.0 GPA required for GE	
Graduation Requirements (required by CSU)	
American Institutions: U.S. History. The following Area 4 courses also satisfy the U.S History Graduation Requirement: HIST 17A, 17B, 18B, 151B, 159, 161, 162, 167, 177; ANTH 101, WGS 110.*	3
American Institutions: U.S Constitution & California Government. The following Area 4 courses also satisfy the U.S Constitution & CA Government graduation requirement: POLS 1, 113, 150.*	3
Writing Intensive (WI) WI courses may also satisfy an Upper Division GE or Major Requirement (C- or better required).	3
Graduation Requirements (required by California State University, Sacramento)	
Second Semester Composition (ENGL 20, ENGL 20M or an approved equivalent) must be completed with a C- or better.	3
Race & Ethnicity in American Society (R&E). R&E courses may also satisfy a GE Area 3, 4, or 6 Requirement	3

Foreign Language Graduation Requirement (FLGR). If not satisfied 0-8 before entering CSUS, 4-5 units towards the FLGR may also satisfy a GE Area 3B Requirement. (C- or better required). The Foreign Language Graduation Requirement is described here: <https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html>.

MS Chemistry (Biochemistry)

Program Requirements

Code	Title	Units
Required Courses (11 Units)		
CHEM 200	Research Methods in Chemistry	3
CHEM 260 ^{\$}	Protein Biochemistry	3
CHEM 261 ^{\$}	Nucleic Acid Chemistry	3
Seminar in Chemistry - Semester1		
CHEM 294	Seminar In Chemistry	0.5
Seminar in Chemistry - Semester2		
CHEM 294	Seminar In Chemistry	0.5
Seminar in Chemistry - Semester3		
CHEM 294	Seminar In Chemistry	0.5
Seminar in Chemistry - Semester4		
CHEM 294	Seminar In Chemistry	0.5
Electives (9 Units)		
Select 9 units from the following: ¹		9
CHEM 220	Spectrometric Identification of Compounds	
CHEM 226	Physical Organic Chemistry	
CHEM 230	Separation Methods in Chemistry	
CHEM 234	Principles and Applications of Mass Spectrometry	
CHEM 245	Applications of Computational Chemistry	
CHEM 250	Selected Topics in Chemistry	
CHEM 251	Topics in Interdisciplinary Chemistry	
CHEM 252	Topics in Synthetic Chemistry	
CHEM 253	Topics in Applied Chemistry	
CHEM 254	Topics in Physical Chemistry	
CHEM 255	Topics in Chemistry Education	
CHEM 267	Biochemistry of Aging	
BIO 222 ^{\$}	Molecular Biology	
BIO224 ^{\$}	Genomics, Proteomics, and Bioinformatics	
BIO 227 ^{\$2}	Stem Cell Biology and Manufacturing Practices	
BIO 285 ^{\$2}	Topics in Biology	
Completion Requirements (10 Units)		
CHEM 299	Special Problems	6
CHEM 500	Culminating Experience	4
Total Units		30

^{\$} CHEM260 or CHEM261 may be used to fulfill the Upper Division Chemistry elective and be double-counted towards the fulfillment of the MS course requirements

^{\$} BIO222, 224, 227, 285 may be used to fulfill the Upper Division Biological Sciences elective and be double-counted towards the fulfillment of the MS course requirements.

¹ Graduate courses in appropriate areas (such as BIO, GEOL, PHYS, ENVS) may be used upon graduate advisor and department chair approval.

² BIO285 is a course offered by BIO faculty in their area of expertise; consult with the graduate advisor whether a particular BIO285 course topic is appropriate. BIO227 requires instructor permission, and BIO121 is strongly recommended prior.

For undergraduate programs, provisions for articulation of the proposed major with community college programs:

Courses for the Blended program that are required in the BS in Biochemistry program already have established articulation agreements with community college programs.

Will this program require specialized accreditation?

Establishment of a master's degree program should be preceded by a national professional accreditation of the corresponding bachelor's degree major program.

Will this program require accreditation?

No

Need for the Proposed Degree Major Program**Is the proposed degree program offered at any California State University campus or any neighboring institutions?**

Yes

List of other California State University campuses currently offering or projecting the proposed degree major program; list of neighboring institutions, public and private, current offering the proposed degree major program:

San Francisco State University (SFSU): B.S. in Biochemistry + M.S. in Chemistry: Concentration in Biochemistry
 Cal Poly San Louis Obispo (Cal Poly SLO): BS in Biochemistry + MS in Polymers and Coatings Science
 University of California Santa Barbara (UCSB): BS Biochemistry + MS in Biochemistry and Molecular Biology

Differences between the proposed program and the programs listed above:

The Cal Poly SLO program has an MS specialization not in Biochemistry but in Polymer Science. The UCSB program specializes in Molecular Biology at the MS level.

The SFSU program differs at the level of MS course offerings by focusing on chemical topics and biochemical enzymology. The CSUS program has a wider range of biochemical course offerings, including a variety of chemistry, molecular biology, and genomics course offerings that enable students to specialize in a broad range of different types of expertise. This allows students to tailor their education to a variety of professional opportunities in the life sciences sector, chemical and pharmaceutical industries, or the government sector.

List of other curricula currently offered by Sac State which are closely related to the proposed program:

NA

For graduate programs, the number of declared undergraduate major and the degree production over the preceding years of the corresponding baccalaureate program:

BS Biochemistry

Spring/Summer 2020: Awarded Degrees: 12; Total declared Majors: 128 (9.4%)

Fall 2020: Awarded Degrees: 13; Total declared Majors: 134 (9.7%)

Spring/Summer 2021: Awarded Degrees: 19; Total declared Majors: 124 (15.3%)

Total Academic Year: 32

Fall 21: Awarded Degrees: 19; Total declared Majors: 129 (14.7%)

Spring/Summer 2022: Awarded Degrees: 13; Total declared Majors: 108 (12%)

Total Academic Year: 32

Fall 22: Awarded Degrees: 6; Total declared Majors: 121 (5%)

Spring/Summer 2023: Awarded Degrees: 23; Total declared Majors: 115 (20%)

Total Academic Year: 29

Fall 23: Awarded Degrees: 7; Total declared Majors: 111 (6.3%)

Spring/Summer 2024: Awarded Degrees: 16; Total declared Majors: 102 (15.7%)

Total Academic Year: 23

Fall 24: Awarded Degrees: 6; Total declared Majors: 129 (4.7%)

Spring/Summer 2025: Awarded Degrees: 18; Total declared Majors: 123 (14.6%)

Total Academic Year: 24

Professional uses of the proposed degree major program:

Students who complete the blended program will be well-prepared to enter the workforce in the general Life Sciences field, such as the pharmaceutical industry and biotech, but also in academic positions and government agencies, and non-profit organizations.

Job opportunities are expected to show solid growth of ~7% over the next several years. Many advanced professional opportunities are locked behind advanced degree requirements (or the equivalent in professional experience). A graduate of the blended program will thus have a strong competitive advantage over comparable applicants.

Existing Support Resources for the Proposed Degree Major Program

List faculty members, with rank, appointment status, highest degree earned, date and field of highest degree, and professional experience (including publications if the proposal is for a graduate degree), who would teach in the proposed program:

Name	Rank	Appointment Status	Highest Degree Earned	Year of Highest Degree Earned (YYYY)	Publications/Professional Experience
Johannes Bauer	Associate Professor	Full Time	Doctorate	2001	https://scholars.csus.edu/esploro/profile/johannes_bauer/output/all?institution=01CALUSL
Susan Crawford	Professor	Full Time	Doctorate	1994	https://www.researchgate.net/profile/Susan-Crawford
Benjamin Gherman	Professor	Full Time	Doctorate	2003	https://scholars.csus.edu/esploro/profile/benjamin_gherman/output/all?institution=01CALUSL
Monica Gonzalez	Assistant Professor	Full Time	Doctorate	2020	https://scholars.csus.edu/esploro/profile/monica_gonzalez/output/all?institution=01CALUSL
Jacqueline Houston	Associate Professor	Full Time	Doctorate	2006	https://scholars.csus.edu/esploro/profile/jacqueline_houston/output/all?institution=01CALUSL
Cynthia Kellen-Yuen	Professor	Full Time	Doctorate	1993	https://scholars.csus.edu/esploro/profile/cynthia_kellenyuen/output/all?institution=01CALUSL
Yujuan Liu	Assistant Professor	Full Time	Doctorate	2017	https://scholars.csus.edu/esploro/profile/yujuan_liu/output/all?institution=01CALUSL
Claudia Lucero	Associate Professor	Full Time	Doctorate	2005	https://scholars.csus.edu/esploro/profile/claudia_lucero/output/all?institution=01CALUSL
Katherine McReynolds	Professor	Full Time	Doctorate	1999	https://scholars.csus.edu/esploro/profile/katherine_mcreynolds/output/all?institution=01CALUSL
Justin Miller-Schulze	Associate Professor	Full Time	Doctorate	2009	https://scholars.csus.edu/esploro/profile/justin_millerschulze/output?institution=01CALUSL
James Miranda	Professor	Full Time	Doctorate	2006	https://scholars.csus.edu/esploro/profile/james_miranda/output/all?institution=01CALUSL
Stefan Paula	Associate Professor	Full Time	Doctorate	1998	https://scholars.csus.edu/esploro/profile/stefan_paula/output/all?institution=01CALUSL

Rebecca Peebles	Assistant Professor	Full Time	Doctorate	2000	https://scholars.csus.edu/esploro/profile/rebecca_peekles/output/all?institution=01CALS_USL
Linda Roberts	Professor	Full Time	Doctorate	1990	https://scholars.csus.edu/esploro/profile/linda_roberts/output/all?institution=01CALS_USL
John Spence	Professor	Full Time	Doctorate	1997	https://scholars.csus.edu/esploro/profile/john_spence/output/all?institution=01CALS_USL
Thomas Savage	Professor	Full Time	Doctorate	1992	https://scholars.csus.edu/esploro/profile/thomas_savage/output/all?institution=01CALS_USL
Roy Dixon	Professor	Full Time	Doctorate	1991	https://scholars.csus.edu/esploro/profile/roy_dixon/output/all?institution=01CALS_USL

Space and facilities that would be used in support of the proposed program: Show how this space is currently used and what alternate arrangements, if any, will be made for the current occupants.

No additional resources would be needed.

Library resources to support the program, specified by subject areas, volume count, periodical holdings, etc.:

No additional resources would be needed.

Equipment and other specialized materials currently available:

No additional resources would be needed.

Additional Support Resources Required

Please attach any additional files not requested above:

BIO Consultation.docx

Blended Roadmap.docx

Impact on other classes and programs.docx

Justification.docx

Key: 605