

MA IN BIOTECHNOLOGY



SACRAMENTO STATE
Redefine the Possible

In Workflow

1. BIO Committee Chair (kneitel@csus.edu)
2. BIO Chair (kneitel@csus.edu)
3. NSM College Committee Chair (mikkel.jensen@csus.edu)
4. NSM Dean (datwyler@csus.edu)
5. Academic Services (catalog@csus.edu)
6. Senate Curriculum Subcommittee Chair (curriculum@csus.edu)
7. Faculty Senate Executive Committee Chair (kathy.garcia@csus.edu)
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9. Dean of Undergraduate (james.german@csus.edu; renee.leonard@csus.edu)
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11. President (sarah.billingsley@csus.edu)
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15. WASC (amy.wallace@csus.edu)
16. Catalog Editor (catalog@csus.edu)
17. Graduate Studies (jdsmall@csus.edu; mxiong@csus.edu)
18. Registrar's Office (wlindsey@csus.edu)

Approval Path

1. Mon, 12 Sep 2022 15:20:17 GMT
Jamie Kneitel (kneitel): Approved for BIO Committee Chair
2. Mon, 12 Sep 2022 15:21:13 GMT
Jamie Kneitel (kneitel): Approved for BIO Chair
3. Wed, 21 Sep 2022 23:22:57 GMT
Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. Wed, 21 Sep 2022 23:35:39 GMT
Shannon Datwyler (datwyler): Approved for NSM Dean

New Program Proposal

Date Submitted: Mon, 12 Sep 2022 14:41:47 GMT

Viewing: MA in Biotechnology

Last edit: Wed, 21 Sep 2022 23:22:31 GMT

Changes proposed by: Kimberly Mulligan (216222319)

Academic Group: (College)

Natural Sciences & Mathematics

Academic Organization: (Department)

Biological Sciences

Catalog Year Effective:

2023-2024 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
Kimberly Mulligan	kimberly.mulligan@csus.edu	916-278-4064

Type of Program Proposal:

Major

Is this a pilot program?

No

Is this a Fast Track program?

No

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

No

Title of the Program:

MA in Biotechnology

Designation: (degree terminology)

Master of Arts

Abstract of the proposal:

We are proposing to create a new stand-alone degree to bring us into compliance with executive order 1071; the previous iteration of this degree—"MA in Biological Science (Stem Cell)"—is not 1071 compliant.

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

We are proposing to create a new stand-alone degree to bring us into compliance with executive order 1071; the previous iteration of this degree—"MA in Biological Science (Stem Cell)"—is not 1071 compliant.

University Learning Goals**Graduate (Masters) Learning Goals:**

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

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

PLO 1. Scientific Communication: To effectively articulate scientific concepts and findings of an original research investigation in the field of biotechnology using different communication modalities.

PLO 2. Critical Thinking and Analytical Reasoning: To critically evaluate scientific problems and to apply quantitative and analytical reasoning to assess data in the field of biotechnology.

PLO 3. Scientific Method & Experimental Skills: To gain expertise through hands-on training in technical skills/experimental methods of biotechnology.

PLO 4. Information Literacy: To critically engage with current scientific literature.

PLO 5. Professionalism: To demonstrate an understanding of bioethics, and the ability to effectively work within the interdisciplinary framework of biotechnology and related fields.

PLO 6. Equity, Inclusion, and Cultural Competency: To demonstrate awareness of equity issues and the diverse cultural perspectives related to biotechnology research and its applications.

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 (required)

Biotechnology - Assessment Plan.docx

Please attach a Curriculum Map Matrix (required)

Biotechnology - Curriculum Map Matrix.docx

Please attach a five-year budget projection (required)

Biotechnology - Five-Year Budget.docx

Catalog Description:**Units required for MA: 30 includes units required in areas of concentration.**

Program Description

The graduate programs in Biological Sciences offer advanced training and independent investigations in biology that lead to a Master of Arts (MA) in Biotechnology. This degree program allows students who successfully complete the program to upgrade their qualifications for careers in the biotechnology sector or for educational advancement to doctoral programs. The MA in Biotechnology requires original research in a biotechnology-centered discipline and completion of a thesis.

All students are required to complete a thesis involving laboratory research. Research for the thesis may be conducted on campus with a biology faculty member or at an off-campus location. In either case, the student's research must make a new contribution to the field of biotechnology. If the research is conducted off campus, a biology faculty member must be identified as the student's graduate advisor. Following admission to the program, students are advised by a graduate advisor who will supervise their thesis research.

For additional information regarding the Biological Sciences Graduate Program, visit the Biological Sciences website (<http://www.csus.edu/bios/>).

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

Admission Requirements

Admission as a classified graduate student to the MA program in Biotechnology requires:

- a baccalaureate degree;
- completion of a major in biological sciences or closely related field; or completion of 24 units of upper division biological sciences courses or courses in closely related fields, each of which must be passed with a "C-" or better;
- a minimum GPA of 2.75 in all biology courses and a minimum GPA of 3.0 in upper division biology courses;
- two letters of recommendation from persons qualified to judge the applicant's potential for successful graduate study; and
- a statement of purpose.

It is important to note that meeting all admission requirements does not guarantee acceptance into the graduate program. Students who have deficiencies in admission requirements that can be removed by specified additional preparation may be admitted with conditionally classified graduate status. Admission as a conditionally classified graduate student does not guarantee fully classified status. Fully classified graduate status is conferred when all deficiencies identified at the time of admission are removed and a biology faculty member has agreed to serve as their thesis advisor. Any deficiencies in admissions requirements will be noted on a written response to the admission application.

Admission Procedures

Applicants must complete a university application by the posted application deadline date for the term applying. :

- an online application for admission; and
- two sets of **official** transcripts from **all** colleges and universities attended, *other than Sacramento State*.

For more admissions information and application deadlines, please visit <http://www.csus.edu/gradstudies/>

In addition, all prospective graduate students must submit the following application materials directly to the Department of Biological Sciences:

- an online departmental application for admission;
- one set of **unofficial** transcripts from **all** colleges and universities attended, *other than Sacramento State*;
- two letters of recommendation; and
- a statement of purpose.

Departmental applications for admission are due February 15. There is currently **no general call for admission for students to begin in the spring semester**. Approximately eight to ten weeks after receipt of all items listed above, a decision regarding admission will be mailed to the applicant.

No units from the following are acceptable toward the master's degree:

Code	Title	Units
BIO 106	Genetics: From Mendel to Molecules	3
BIO 194	Biology-Related Work Experience	6 - 12

BIO 195	Biological Internship	1 - 2
BIO 197A	Laboratory Teaching Assistant	1 - 2
BIO 197B	Laboratory Techniques	1 - 2
BIO 197C	Co-curricular Activities in Biology	1 - 2
BIO 198A	Honors Proseminar and Research	2
BIO 198B	Honors Research and Seminar	2
BIO 199A	Introductory Undergraduate Research	1 - 2
BIO 199B	Directed Readings	1 - 2

Minimum Units and Grade Requirement for the Degree

Units required for MA: 30

Minimum Cumulative GPA: 3.0

Advancement to Candidacy

The Advancement to Candidacy process serves to ensure that a student is qualified for and making good progress toward successfully completing the Master's degree. Each classified graduate student must file an application for Advancement to Candidacy, indicating a proposed program of graduate study. This procedure should begin as soon as the classified graduate student has:

- removed any deficiencies in admission requirements;
- completed at least 12 units in the graduate program with a minimum 3.0 GPA, including at least one course at the 200-level;
- begun a preliminary study for the thesis; and
- taken the Writing Placement for Graduate Students (WPG) or taken a Graduate Writing Intensive (GWI) course in their discipline within the first two semesters of coursework at California State University, Sacramento or secured approval for a WPG waiver.


An Application for Advancement to Candidacy forms are available on the Office of Graduate Studies Web site and the Department of Biological Sciences Web site. The student fills out the form after planning a degree program in consultation with his/her Biological Sciences graduate advisor. After approval by the Biological Sciences Graduate Committee and the student's thesis committee, the completed form is returned to the Office of Graduate Studies for approval.

All requirements for the Master of Arts degree must be completed within seven (7) years starting from the time the first course is used to meet the master's degree requirements.

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

Program Requirements¹

MA in Biotechnology (30 units)

Code	Title	Units
Required Core Courses (23 Units)		
BIO 220	Introduction to Scientific Inquiry 	2
BIO 221A	Cell and Molecular Methods and Techniques	2
BIO 222	Molecular Biology	3
BIO 225	Stem Cell Biology and Manufacturing Practices	1
BIO 227	Development and Regenerative Medicine	3
BIO 293	Research Conference	2
BIO 294A	Seminar in Molecular and Cellular Biology	2
BIO 299	Problems in Biological Sciences	8
Culminating Requirement (4 Units)		
BIO 500	Master's Thesis	4
Additional Requirements (3 Units)		
Select one of the following:		3
BIO 223	Human Molecular Genetics	
BIO 224	Genomics, Proteomics, and Bioinformatics	
BIO 245	Host/Pathogen Interactions	
BIO 247	Contemporary Topics in Immunology	
BIO 282	Evolution	
CHEM 230	Separation Methods in Chemistry	
CHEM 145/245	Applications of Computational Chemistry	
CHEM 260	Protein Biochemistry	
CHEM 261	Nucleic Acid Chemistry	
Total Units		30

- ¹ The 30 units must include a minimum of 23 units of 200-level courses.
- ² No more than 4 units of BIO 500 may be applied toward the 30 unit requirement. Each student who receives a Master of Science degree from the Department of Biological Sciences must submit a written thesis on a research problem in biology under the supervision of a graduate advisor.

Explanation of special characteristics of the proposed degree major program; e.g., in terminology, units of credit required, types of course work, etc.:

Students are required to attend the Regenerative Medicine Lecture (RML) lecture series, which includes one seminar per semester.

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:

CSU San Marcos, San Francisco State University, Cal State Los Angeles, CSU Fresno

Differences between the proposed program and the programs listed above:

N/A

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

N/A

Attach the results of a formal survey in the geographical area to be served indicating demand for individuals who have earned the proposed degree and evidence of serious student interest in majoring in the proposed program:

NA.docx

Provide justification for any discrepancies between national/statewide/professional manpower surveys and local findings:

N/A

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

The preexisting MA in Biological Sciences (Stem Cell) Program has graduated a total of 8 cohorts of 8-10 students per year. We currently have one cohort of 8 students total.

Professional uses of the proposed degree major program:

This degree prepares students for laboratory positions in the biotechnology sector and also provides educational advancement to doctoral programs.

The expected number of majors in:

1st Year Enrollment:

10

3rd Year Enrollment:

20

5th Year Enrollment:

20

1st Year Graduates:

0

3rd Year Graduates:

10

5th Year Graduates:

10

Existing Support Resources for the Proposed Degree Major Program

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.

N/A (This is an elevation of a preexisting program)

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

N/A (This is an elevation of a preexisting program)

Equipment and other specialized materials currently available:

N/A (This is an elevation of a preexisting program)

Additional Support Resources Required

Enrollment and faculty positions should be shown for all discipline categories which will increase because of the new program and for all discipline categories which will decrease because of the new program. If faculty positions are to be transferred into the new program from other areas, the reductions in faculty positions should be shown on the appropriate discipline category or categories:

N/A (This is an elevation of a preexisting program)

Any special characteristics of the additional faculty or staff support positions needed to implement the proposed program:

N/A (This is an elevation of a preexisting program)

The amount of additional lecture and/or laboratory space required to initiate and sustain the program over the next five years: Indicate any additional special facilities that will be required. If the space is under construction, what is the projected occupancy date? If the space is planned, indicate campus wide priority of the facility, capital outlay program priority, and projected date of occupancy.

N/A (This is an elevation of a preexisting program)

Additional library resources needed: Indicate the commitment of the campus to purchase or borrow through interlibrary loan these additional resources.

N/A (This is an elevation of a preexisting program)

Additional equipment or specialized materials that will be 1) needed to implement the program and 2) needed during the first two years after initiation: Indicate source of funds and priority to secure these resource needs.

N/A (This is an elevation of a preexisting program)

Key: 536