BIOLOGICAL SCIENCES (MS)

Offered at: San Luis Obispo Campus

The M.S. Biological Sciences degree program provides students with the training needed for biological work that requires advanced research-based skills beyond a bachelor's degree. The degree program is designed to prepare students for careers in industry, civil service agencies, or further graduate work leading to a Ph.D. Graduates of the M.S. program have gone on to careers in private companies, environmental consulting, federal and state government agencies, or Ph.D. graduate work.

Requirements for Admission

Students apply via Cal State Apply and must submit a transcript, three (3) letters of recommendation from persons familiar with the recent academic or work performance of the applicant, a Curriculum Vitae (CV), and a Personal Statement that describes the following: the applicant's research interests, motivation for pursuing a M.S. in Biological Sciences, and how their experience has prepared them for M.S. graduate-level research and study.

International Students must meet all the standard eligibility criteria and demonstrate proficiency in English (English Proficiency Exam Requirements (https://www.calpoly.edu/admissions/international-student/selection-criteria/english-exam-requirements/))

Prerequisites: One year of coursework in biology and one course in each of the following areas: 1) general chemistry, 2) calculus, statistics, or data science, 3) genetics or molecular biology, and 4) evolution.

Minimum GPA: 3.0

Application due date: Please see Graduate Student Dates and Deadlines (https://www.calpoly.edu/admissions/graduate-student/dates-and-deadlines/) for application deadlines.

Advancement to candidacy

Completion of at least 6 units of graduate coursework with cumulative and higher ed GPA of 3.0 or higher and an approved culminating experience proposal.

Culminating Experience

Written M.S. thesis and oral M.S. thesis defense. With guidance from a faculty advisor, students will design and complete an original research project, prepare a written M.S. thesis describing that project, and present a public oral defense of that research, after which a faculty committee will have the opportunity to privately ask related questions to the student about that research project.

Specializations

Regenerative Medicine

Offered at: San Luis Obispo Campus

The Specialization in Regenerative Medicine prepares students for research-based careers in regenerative medicine and related fields. Specifically, graduates are prepared for immediate employment in regenerative medicine, biotechnology, or medical technology companies, or as research specialists/laboratory managers at universities or research institutes. Program graduates are also well-prepared to matriculate into biological sciences doctoral programs or graduate programs in the health professions.

Culminating Experience

Students who obtain a degree in M.S. in Biological Sciences with a Specialization in Regenerative Medicine are not required to complete an original research M.S. thesis. In place of the thesis as a culminating experience, students complete a Project during a 10-month internship at a company or academic research laboratory. The Project Report and Project Presentation are evaluated by the student's Cal Poly and Internship Mentors. In addition, the Presentation is evaluated by the Program Director.

Program Learning Objectives

1. Demonstrate a thorough understanding and competency in a subdiscipline of specialization within the biological sciences.
2. Communicate scientific ideas effectively in both oral and written formats.
3. Demonstrate an ability to think critically and evaluate, design, conduct, and quantitatively analyze or assess research in a biological discipline.
4. Demonstrate the skills and knowledge needed for employment or advanced graduate or professional study in discipline-related areas.

Specialization in Regenerative Medicine

1. Perform fundamental laboratory skills involved in regenerative medicine research & development.
2. Discuss and critically evaluate biomedical primary literature.
3. Effectively communicate technical topics to both peer and lay audiences.
4. Explain the process of biotechnology development & commercialization.

5. Describe how research & development efforts are motivated by and impact physician & patient experiences.
6. Design and execute independent research projects.

Code	Title	Units
REQUIRED COURSES		
BIO 5501	Molecular and Cellular Biology	4
or BIO 5502	Evolution, Ecology, and Organismal Biology	
Select from the following:		2-3
BIO 5504	Research Career and Proposal Development	
BIO 5583	Research and Professional Development for Regenerative Medicine Students	
Select from the following:		1-2
BIO 5591	Biology Colloquium	
BMED 5563	Biomedical Engineering Graduate Seminar	
Select from the following:		3
BIO 5509	Communicating Biology to Various Audiences	
BIO 5528	Principles of Stem Cell Biology	
BIO 5531	Advanced Behavioral Ecology	
BIO 5532	Advances in Organismal Physiology	
BIO 5590	Seminar in Biology	
Select from the following:		6
BIO 5598	Project [1]	
BIO 5599	Thesis	
Approved Electives		
Select from the following:		12-13
Select any 4000 level BIO courses, except for BIO 4400, BIO 4450, BIO 4461, BIO 4462, BIO 4463, BIO 4466		
BIO 5500	Individual Study	
BIO 5505	Scientific Writing and Communication	
BIO 5506	Data Management and Visualization in Biology	
BIO 5509	Communicating Biology to Various Audiences	
BIO 5511	Advanced Cell Culture Techniques	
BIO 5531	Advanced Behavioral Ecology	
BIO 5532	Advances in Organismal Physiology	
BIO 5570	Special Advanced Topics	
BIO 5571	Special Advanced Laboratory	
BIO 5574	Teaching Strategies for College Biology Laboratories	
BIO 5575	College Biology Teaching Practicum	
BIO 5585	Cooperative Education Experience	
BIO 5590	Seminar in Biology	
BIO 5591	Biology Colloquium	
BIO 5595	Cooperative Education Experience	
BMED 4480	Drug Discovery and Development	
BMED 5510	Principles of Tissue Engineering	
BMED 5515	Biomedical Imaging	
BMED 5560	Cell Transplantation and Biotherapeutics	
BMED 5561	Cell Transplantation and Biotherapeutics Laboratory	
STAT 5120	Intermediate Statistics for Graduate Students	
STAT 5430	Applied Regression Analysis for Graduate Students	
STAT 5440	Statistical Methods for Study Design and Analysis	
STAT 5550	Statistical Learning with R	
Total Units		**30**

[1] BIO 5598 is only an option for students in the Regenerative Medicine Specialization.

Specializations
Regenerative Medicine

Code	Title	Units
REQUIRED COURSES		
BIO 5501	Molecular and Cellular Biology	4
BIO 5509	Communicating Biology to Various Audiences	1
BIO 5511	Advanced Cell Culture Techniques	1
BIO 5528	Principles of Stem Cell Biology	2
BIO 5583	Research and Professional Development for Regenerative Medicine Students	2
BIO 5598	Project	6
BMED 5510	Principles of Tissue Engineering	3
BMED 5515	Biomedical Imaging	3
BMED 5563	Biomedical Engineering Graduate Seminar	1
STAT 5120	Intermediate Statistics for Graduate Students	3
Approved Electives		
Select from the following:		4
ASCI 4403	Applied Biotechnology in Animal Science	
BIO 4433	Neuroscience	
BIO 4451	Bioinformatics Applications	
BIO 4455	Developmental Biology	
BIO 4456	Immunology	
BIO 4457	Molecular Biology Laboratory	
BIO 5500	Individual Study	
BIO 5506	Data Management and Visualization in Biology	
BIO 5570	Special Advanced Topics	
BIO 5571	Special Advanced Laboratory	
BIO 5574	Teaching Strategies for College Biology Laboratories	
BIO 5575	College Biology Teaching Practicum	
BIO 5590	Seminar in Biology	
BIO 5591	Biology Colloquium	
BMED 4480	Drug Discovery and Development	
BMED 5560	Cell Transplantation and Biotherapeutics	
BMED 5561	Cell Transplantation and Biotherapeutics Laboratory	
STAT 5430	Applied Regression Analysis for Graduate Students	
STAT 5440	Statistical Methods for Study Design and Analysis	
STAT 5550	Statistical Learning with R	
Total Units		**30**