

## Biotechnology

Biotechnology is a rapidly growing component of molecular and cellular life sciences study wherein new products and applications are commercialized. There is an increased need for highly skilled personnel capable of working in research, development, and production in such fields as pharmaceuticals development, crop and livestock improvements, industrial processing, diagnostic and therapeutic medicine, forensic identification, bioremediation, genomics, proteomics, and bioinformatics. California State University, Fresno offers two means for students to develop the expertise for roles in the biotechnology industry: a master's degree and a certificate.

## Master of Biotechnology (M.Bt.)

The Master of Biotechnology offers students who are fundamentally educated in varied scientific disciplines the opportunities to advance their scientific skills. It allows them to acquire the business knowledge and skills necessary to commercialize emerging technologies or their products. Offered as a two-year program, it is representative of a unique interdisciplinary degree concept, the Professional Science Master's (PSM) degree, designed for students interested in entering the workforce in leadership roles to promote the development and production of new products and processes.

**Admission Requirements for the M.Bt.** Students must complete university graduate division admission requirements and must possess an appropriate four-year undergraduate science degree with a minimum 3.0 GPA. There are six categories of specific course prerequisites; completion of three categories constitutes the minimum for classification, but all six categories must be completed prior to award of degree. Fresno equivalent courses are indicated in parentheses.

Prerequisite courses are as follows:

1. General Genetics (BIOSC 140A)
2. Microbiology with Lab (MICRO 140)
3. Biochemistry with Lab (CHEM 150/155 and 156)
4. Immunology with Lab (PHYAN 160 and 160L)
5. Analytical Chemistry (CHEM 102/105)
6. Statistics (MATH 101)

## Master of Biotechnology Degree Requirements

	<i>Units</i>
<b>I. Core Curriculum</b> .....	<b>21</b>
A. BIOL/CHEM 241A-B ... (3-3)	
B. BIOL/CHEM 248 .....	(1-1)*

C. MBA 270 .....	(3)
D. MBA 272 .....	(3)
E. BIOTC 275 .....	(3)
F. BIOTC 298 or 299 .....	(4)

## II. Electives .....

9  
*Minimum of three courses in separate categories A-J; only one may be undergraduate.*

A. BIOL/CHEM 242 .....	(3)
B. BIOL/CHEM 243 .....	(3)
C. BIOL/CHEM 244 .....	(3)
D. BIOL/CHEM 245 .....	(3)
E. AGRI 200 or BIOL 274 ...	(3)
F. PLANT 108 .....	(3)
G. CSCI 101 .....	(3)
H. CHEM 106 .....	(3)
I. FSC 120 .....	(4)
J. FSC 178 .....	(2)

**Total** .....

**30**

\* The Graduate Writing Requirement is completed in conjunction with the second enrollment of this course. Consult adviser for details.

## Biotechnology Certificate Program

The Certificate of Advanced Study in Biotechnology is a postbaccalaureate, one-year, laboratory-intensive program of study consisting of eight specified courses selected from the M.Bt. program courses. Students may not receive both the M.Bt. and the Certificate of Advanced Study in Biotechnology.

Students interested in entry-level biotechnology careers may pursue the certificate to acquire a breadth of relevant technical skills and knowledge for enhanced career options. Students with advanced degrees (M.S., Ph.D., J.D., M.D.) may expand their skills for specific careers. Students interested in research careers in biotechnology fields are encouraged to supplement a disciplinary master's degree with the certificate. Double-counting of courses for the certificate and the master's degree is possible, but 9 units independent of master's degree coursework must be reserved for the certificate.

**Admission Requirements for the Certificate.** All admission requirements for the M.Bt. apply *except* that the prerequisite courses are limited to categories 1-4, and the minimum for admission to the program is two courses, i.e. general genetics and biochemistry lecture. All prerequisite courses must be completed for the certificate award.

## Certificate Requirements

	<i>Units</i>
<b>Set program of study</b> .....	<b>20</b>
(See M.Bt. program requirements on this page for specific courses.)	

College of Science and Mathematics

## Biotechnology Program

Alice Wright, *Program Director*

Tambra Bane, *Associate Director*

Science II Building, Room 361  
559.278.6076

## Master of Biotechnology (M.Bt.)

### Biotechnology Certificate of Advanced Study

M.Bt. Core requirements

IA and IB .....

(8)

M.Bt. Courses

IIA, B, C, F .....

(12)

## COURSES

*Enrollment in BIOTC courses is limited to M.Bt./PSM students.*

## Biotechnology (BIOTC)

### BIOTC 275. Biotechnology Industrial Experience (3)

Prerequisites include PSM program classification; BIOL/CHEM 241B; BIOL/CHEM 248; BUS 272; or permission of instructor. Internship to develop familiarity with biotechnology business practices. Requires a minimum of 150 hours of onsite work and completion of a project for written and oral presentation. Specific placement is facilitated by the PSM coordinator.

### BIOTC 298. Biotechnology Culminating Project (4)

Prerequisites include PSM advancement to candidacy and completion of all other courses in the program of study. Field studies — including appropriate experimentation — addressing a biotechnology business/science problem identified through student's independent analysis. Extensive written documentation is required on the plans and outcomes. A final progress report meeting the requirements of the culminating experience for a master's degree and an oral defense are required.

### BIOTC 299. Applications-Oriented Thesis (4)

Prerequisites include PSM advancement to candidacy and completion of all other courses in the program of study. Preparation, completion, and submission of an acceptable thesis for a master's degree addressing independent investigations on the application of innovative biotechnological methods or products. An oral defense is required.