PSM in Biotechnology

CALIFORNIA STATE UNIVERSITY SAN MARCOS

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R. E. _____ Catalog_____File_____

PROGRAM CHANGE PROPOSAL - Form P-2

COLLEGE ☐ CHABSS ☐ CoBA ☐ CoEHHS x☐ CSM

TITLE OF PROGRAM Professional Masters Degree in Biotechnology Discipline Biological Sciences

Check one: x☐ Change to Program ☐ Program Deletion

TITLE OF DEGREE PROGRAM: Professional Masters Degree in Biotechnology

This form is the signature sheet for a change to, or deletion of, an existing program.
Note that the addition of a new option/concentration/emphasis/track is a new "program," and requires the use of Form P.

For a change to a program,
1. Attach a page (or pages) giving a brief summary of the purpose of this proposal, and its connection to the mission and student learning outcomes of the program.
2. Attach catalog copy showing exactly how the program should appear in the catalog if the changes are approved.

For a program deletion, attach a statement explaining the impact on students: how will the program be "taught-out" for declared majors?

Does this proposal impact other disciplines or units? ___x___ Yes _____No If yes, obtain signature(s).
Any objections or concerns should be stated in writing and attached to this form. Please check the box to indicate whether a memo has been attached.

Business Administration Discipline/Unit	Signature ☐	11/27/2017 Date	X Support	_____Oppose
Biology Discipline/Unit	Signature ☐	11/27/2017 Date	X Support	_____Oppose
Biochemistry and Chemistry Discipline/Unit	Signature ☐	11/28/17 Date	✓ Support	_____Oppose
_____ Discipline/Unit	_____ Signature ☐	_____ Date	_____Support	_____Oppose

1. Betsy Read Originator (Please Print) 1/27/2017 Date

2. _____ Program/ Department - Director/Chair 1/30/17 Date

APPROVAL PROCESS

3. _____ College Curriculum Committee^ ☐ 11/27/17 Date

4. _____ College Dean (or Designee)* ☐ 12/1/17 Date

5a. _____ University Curriculum Committee^ ☐ _____ Date

5b. _____ Budget and Long-Range Planning Committee (if applicable)^ ☐ _____ Date

6. _____ Academic Senate _____ Date

7. _____ Provost (or Designee) _____ Date

8. _____ President _____ Date

9. _____ Date to Chancellor's Office (if applicable)

* Where appropriate, attach a memo on program impact on the unit and the ability of the unit to support it. Check the box next to the signature line to indicate whether a memo has been attached.
^ Where appropriate, attach a memo summarizing the curricular and/or resource deliberations. Check the box next to the signature line to indicate whether a memo has been attached.

Academic Programs Revised 10/10/13

Tracker ___
RP ___

RECEIVED
DEC 01 2017
BY: _____

Responses to the Committee's Concerns Regarding the PSM in Biotechnology's P-2 Form

- BA 504 and BA 670 are CoBA classes, and should go through their curriculum review process. You are listed as the originator for BA 504, but since you are not CoBA faculty you will probably need to ask someone there to submit the form.

The C-2 Forms for BA 504 and BA 670 were reviewed and signed off by CoBA last Spring. These were submitted to the committee in April of last year. Laurie Schmeltzer has the original hard copies, and I have attached copies herein.

- The justification for variable unit courses in the P2 form doesn't explain the need for variable units. That some students are part time doesn't affect the number of units required for a degree. Cases we are aware of that use variable units in classes are independent study classes that depend on the size of project that students complete. If that is the reason for using a variable number of units in Biot 680AB and Biot 681AB please clarify.

This is indeed the case. International students routinely need additional guidance/instruction writing their proposals; for many English is their second language and they struggle with writing. Since they are required to be enrolled full time, and need extra help it would be beneficial to provide an additional unit of formalized instruction. Hence, the BIOT 680B option.

Semester-in-Residence Projects routinely exceed the 180 hours required for 4 units of course credit. We would like to afford students the opportunity to have this reflected on their transcript in the form of an additional unit of course credit, if they so desire (BIOT 681B).

- The total number of units for the degree should not be variable, even if some of the classes have variable units. The required number of units is the minimum number that can be taken to earn the degree. For example, it is common for students who get a BS or MS in stateside programs to have more than the minimum required units, but we do not list a variable number required in our catalog.

We have changed the required number of units in the degree program to the minimum 38 units as suggested with a footnote to indicate that additional units may be required of students with deficiencies and/or in cases where project demands are such that additional units are warranted.

- Chem 440A and Chem 440B are the same class, except that Chem 440B has a lab while Chem 440A does not. It appears that a proposal for a lecture class with an optional lab, which we usually accommodate by having two separate classes, one for the lecture and one for the optional lab. Use of this 440A, 440B construction seems potentially confusing. Please justify the need to use this approach, or change it to a more standard lecture with optional lab section (such as Chem 440 and Chem 440L).

As suggested, we have changed the course numbering as suggested by the committee to Chem 440 and Chem 440L.

ATTACHMENT

The life science industry is constantly evolving and changes as new applications and tools are developed, and ways of doing business are adjusted. The curriculum of the Professional Masters Degree Program in Biotechnology needs to reflect these changes. To do so, necessitates revisions from time to time, of program requirements and course titles and content. The changes proposed herein are a results of discussions with our External Advisory Board, recommendations from our 5-year and annual reviews, feedback from our graduates, and interactions/demands from the life science industry and associations. Changes also align with the original goals of the program, provide opportunities for students to keep abreast of the rapidly advancing skills and knowledge in the life sciences, and meet the needs of the dynamic workforce.

Proposed Changes:

1. Course Title Change
   Current: **BA 504 Financial Accounting**
   Proposed: **BA 504 Accounting for Managers**

   The new title proposed by the instructor of the course, will more accurately reflect the course description, and content as it currently exists. The C-2 form for the title change is attached.

2. Course Numbering Changes
   a. Current: **BIOT 680 A SIR Writing Workshop (1)**
      Proposed: **BIOT 680 (A-B) SIR Writing Workshop (1-2)** (see 4B below)

   b. Current: **BIOT 680 B Semester-in-Residence (4)**
      Proposed: **BIOT 681 (A-B) Semester-in-Residence (4-5)** (see 4C below)

3. Course Additions (see C-forms attached)

   a. **BA 627 Business Analytics and Project Management (3)**
      To comply with the MOU drafted after our 2013 External Review, a course that incorporates project management was developed. A C-form for this course was submitted and approved in the Spring of 2015. The course content contributes to our student learning outcomes:

      #3. Employ quantitative, analytical and decision-making skills to solve problems in the life science and technology oriented business sector.

      #4. Assess different leadership styles and the skills and techniques used to manage teams, budges, projects and decisions in a business environment.

   b. **BIOT 500 Preparation for PSM and Bioscience Industry Engagement (1)**
      At the recommendation of both alumni and our External Advisory Board this course was developed to: 1) introduce students to the corporate culture of the life science industry by bringing some of the top leaders to campus to talk about their careers and company experiences, and 2) prepare students for successful internships and facilitate Semester-in-Residence placements. The course content addresses the following student learning outcomes:

#4. Assess different leadership styles and the skills and techniques used to manage teams, budges, projects and decisions in a business environment.

#5. Apply communication principles and skills to translate and present both orally and in writing scientific concepts, data and information for intended audiences.

c. **BIOT 675 Bioscience Beyond the Borders (2)**
More companies are expanding into the global markets for growth and profitability, and to create partnerships and/or alliances. Because of this, and the significant number of international students enrolled in our program, a course is needed that addresses the unique political, economic, legal, social and cultural systems. Such a course is directly related to the following student learning outcomes

#6. Identify regulatory, societal, and environmental issues and their impact upon biotechnology advances, product offerings and business.

#2. Describe the procedural and operational uniqueness of the highly regulated life science industry.

d. **BA 670 BioEntrepreneur: Science to Market (2)**
San Diego houses one of the largest conglomerates of biotech start-up companies owing to the large number of academic institutions in the region. Hence, it is important that our students are well versed in theory and practice of bioentrepreneurship and are aware of the transformative and disruptive nature of scientific discoveries and the innovative and entrepreneurial process of turning knowledge into business. The course content addresses all six of the program student learning outcomes including:

#1. Apply concepts and principles of the sciences that are fundamental to the discipline of biotechnology.

#2. Describe the procedural and operational uniqueness of the highly regulated life science industry.

#3. Employ quantitative, analytical and decision-making skills to solve problems in the life science and technology oriented business sector.

#4. Assess different leadership styles and the skills and techniques used to manage teams, budges, projects and decisions in a business environment.

#5. Apply communication principles and skills to translate and present both orally and in writing scientific concepts, data and information for intended audiences.

#6. Identify regulatory, societal, and environmental issues and their impact upon biotechnology advances, product offerings and business.

e. **CHEM 440 Protein Structure and Function in the Life Sciences**
CHEM 440 L Protein Structure and Function in the Life Sciences

This course was developed at the request of students. The optional 1-unit laboratory component (L) will complement the lecture, and enable those who are deficient or need to refresh laboratory skills, the opportunity to gain additional hands-on experience with methods in molecular biology and protein structure and function.

4. Variable Unit Courses

The following courses are being redesigned as variable unit courses to accommodate the needs of the diverse population of students enrolled in the program. These courses will allow Veterans and International students to enroll in the PSM as full-time students, while enabling domestic students, many of whom are working professionals, to advance their careers and earn their degree attending classes on a part-time basis. International students often need additional writing instruction and want additional internship experience. *Visa requirement,s moreover, are such that International Students are required to be full-time students. The GI bill requires the same of Veterans.*

a. **BIOT 680 (A-B) SIR Writing Workshop (1-2)**

Writing is a challenge for a number of our students who spend an inordinate number of hours at the writing center and with private tutors. Providing a variable unit BIOT 680 course will enable students who need it, to receive additional scientific writing instruction in a more streamlined and formalized manner. For example, as reflected in the course syllabi, students in BIOT 680 (A) will meet every other week for the first ten weeks of the semester. Those needing more direction or who desire additional instruction/assistance with the writing of their proposals, will enrolled in BIOT 680 (B) and meet every week for the same 10 weeks, and have double the workload.

b. **BIOT 681 (A-B) Semester-in-Residence (4-5) (see course number change above 2b)**

"A" is 4 units and "B" is 5 units. Students who are not currently employed are anxious to obtain as much experience as possible and often spend well over the required 300 hours on their Semester-In-Residence project. The additional effort and the uniqueness of the project/innovation should be reflected on their transcripts if so desired.

5. Delete the Following Course Requirements from the Catalog Program Description

BIOT 690 Case Studies and Current Trends in Biotechnology
BA 503 Statistics for Management
BA 505 Marketing

6. Course Requirements

a. **Current:** The 38 unit program requires the completion of the following courses in this sequence:

Year	Semester	Course No.	Description	Units
1	Fall	CHEM 450	Protein Structure and Function	3
		BIOT 660	Scientific Communication in Tech Industry	2
		BA 503	Statistics for Management	3
				8

1	Spring	BIOT 600	Genomics and DNA/RNA Technologies	5
		BIOT 650	Regulatory Affairs and Quality Management	3
				8
1	Summer	BIOT 620	Bioprocessing and Bioengineering	3
		BA 505	Marketing	2
		BIOT 630	Experimental Design & Statistical Analysis	3
				8
2	Fall	BIOT 690	Case Studies and Current Trends in Biotech	2
		BIOT 655	Business Law and Intellectual Property	2
		BIOT 680A	SIR Writing Workshop	1
		BA 504	Financial Accounting	3
				8
2	Spring	BIOT 680B	Semester-in-Residence	4
		BA 506	Management of Complex Organizations	2
				6
			Total Units	38

b. **Proposed:** With the proposed changes, students are expected to complete between 38-42 units to earn their degree. As outlined below, the variable units makes it feasible for Veterans and International students to enroll and move through the program as full-time students while domestic students can complete the degree on a part-time basis. Many of our domestic students are working professionals and prefer to pursue their degree on a part-time basis. *The proposed changes will thus facilitate enrollment by enabling us to accommodate both student populations.*

Year	Semester	Course No.	Description	Units
1	Fall	CHEM 440	Protein Structure and Function	3
		CHEM 440L	Protein Structure and Function Lab	1
		BIOT 660	Scientific Communication in Tech Industry	2
		BIOT 630	Experimental Design and Statistics	3
				8-9
1	Spring	BIOT 600	Genomics and DNA/RNA Technologies	5
		BIOT 650	Regulatory Affairs and Quality Management	3
		BIOT 500	Prep for the PSM and Biotech Industry	1
				8
1	Summer	BIOT 620	Bioprocessing and Bioengineering	3
		BA 506	Management of Complex Organizations	2
		BIOT 675	Bioscience Beyond the Borders	2
				7
2	Fall	BA 504	Accounting for Managers	3
		BIOT 655	Business Law and Intellectual Property	2
		BIOT 680(A-B)	SIR Writing Workshop	1-2
		BA 670	The BioEntrepreneur: Science to Market	2
				8-9
2	Spring	BIOT 681(A-B)	Semester-in-Residence	4-5
		BA 627	Business Analytics & Project Management	3
				7-8
			Total Units (Minimum)	38*

- Some students may be required to take additional units where there are deficiencies and/or when project demands warrant additional units.

MASTER OF BIOTECHNOLOGY*

Office:
Foundation Classroom Building, 6-108

Telephone:
(760) 750-4020

Program Director:
Betsy Read, Ed.D.

Program Support:
Eirka, Ervin
Al Kern, Ph.D.

The Master of Biotechnology is a professional science degree program designed to meet the needs of the biotechnology industry and associated organizations. The program combines advanced study of related science, professional preparation, business, and real-world experience for biotechnology-oriented students. The purpose of the degree is to prepare students for careers in technology-related organizations with a breadth of workplace knowledge.

Throughout the program, students will be exposed to real-world problems/applications, teamwork/communication skills, leading-edge technologies, managerial/interpersonal skills, informatics, ethics, industrial knowledge, and problem solving skills.

The rigorous program is taught in the evenings and on weekends to accommodate the working student. The program design is a cohort model that requires students to go through the program together over a five-semester period with a predetermined course sequence. It is a non-thesis degree program requiring a rigorous "Internship or Semester-In-Residence" project.

*This program is offered through the Office of Extended Learning.

Each student will be guided and evaluated by an Advisory Committee that will be made up of university faculty, program instructors, and industry mentors, as well as program advisors.

Student Learning Outcomes

The student who graduates with a Master of Biotechnology will be able to:

1. Apply concepts and principles of the sciences that are fundamental to the discipline of biotechnology.
2. Describe the procedural and operational uniqueness of the highly regulated life science industry.
3. Employ quantitative, analytical and decision-making skills to solve problems in the life science and technology oriented business sector.
4. Assess different leadership styles and the skills and techniques used to manage teams, budgets, projects and decisions in a business environment.
5. Apply communication principles and skills to translate and present both orally and in writing, scientific concepts, data and information for intended audiences.
6. Identify regulatory, societal and environmental issues and their impact upon biotechnology advances, product offerings and business.

Admission Requirements and Application

Admission to the program requires an undergraduate degree with a major in a bioscience or chemistry or related area. Alternatively, applicants with B.A./B.S. degree in a related field with a minor or equivalent work/certification experiences may be considered for conditional admission. While a minimum of a baccalaureate degree is required, applicant evaluation will consider pertinent background, prerequisite courses, and the likelihood for successful completion of the program. Generally, applicants should have courses or experience in:

- Molecular Cell Biology or Molecular or Cellular Biotechnology
- Microbiology
- Statistics
- Chemistry/Biochemistry

Applicants who have not completed an upper-division biochemistry course may be required to take CHEM 341 or 351.

Specific Admission Criteria:

Applicants must meet the general requirements for admission to graduate studies at CSUSM, including an official score report of the General GRE.

An undergraduate grade point average in all completed science and math courses of at least 2.75 or a GPA of at least 3.0 in the last 35 semester units of science and math.

All applicants, regardless of citizenship, who do not possess a bachelor's degree from a post-secondary institution where English is the principal language must satisfy the English language proficiency requirement via one of the three following methods:

1. TOEFL passing score: A score of 80 internet-based (iBT), 213 computer-based (CBT), or 550 paper-based (PBT). Scores above 15 on the Writing section of the iBT will be considered on a competitive basis. Test scores must be sent directly from ETS; please visit the ETS web site at www.toefl.org for detailed information and test locations. Our school code is 5677.
2. IELTS passing score: An overall band score of 6. Be sure to let us know when you take the test and provide us with your Test Report Number (TRN) so we can electronically download the scores. Please visit the IELTS web site at www.ielts.org/ for testing dates and locations.
3. ALCI TOEFL waiver: If you are interested in applying for conditional admission through our American Language Culture Institute (ALCI) (English Language Program), please be sure to contact the Extended Learning Office. You can learn more about conditional admission through ALCI by visiting the ALCI web site at www.csusm.edu/alci/.

Applicants must provide the following information:

- Application Form
- One set of official transcripts from all colleges/universities attended
- Official scores reports of the General GRE
- Two letters of recommendation from persons familiar with the applicant's capacity for academic and professional success
- One-page statement from the applicant on the reason for pursuing a Master of Biotechnology

Student candidates may apply at any time throughout the year. However, selection and admission will be completed by early May for the fall semester start. Later applications will be considered, as spaces remain available. Feedback to applicants, but not final admission decisions, will be provided on a timely basis regardless of the time of application.

Degree Requirements and Courses

The Master of Biotechnology requires thirty-eight (38) semester hours of coursework and project-oriented work experience with a local life-science entity. Additional hours are available for those who need extra lab experience or to meet project demands. Students must complete a set of courses and project work experience with a 3.0 GPA and earn at least a "C" (2.0) in each course. Predetermined advanced level courses and credit hours are:

	Units
Science Fundamentals and Professional Preparation	
BIOT 500	1
BIOT 600	5
BIOT 620	3
BIOT 630	3
BIOT 650	3
BIOT 655	2
BIOT 660	2
BIOT 675	2
CHEM 440	3
CHEM 440L	1
Business Core	
BA 504	3
BA 506	2
BA 627	3
BIOT 670	2
Internship / Residency and Project	
BIOT 680 A-B	1-2
BIOT 681 A-B	4-5

In lieu of a thesis, the candidate must successfully complete a culminating 16-week "Semester Internship/Residency Project" requiring a project proposal, performance assessment, and a final written report with an oral defense. Student projects address and affect a real-world problem in the life science industry demonstrating students' ability to integrate principals of science and technology with fundamental business practices. The type of experience and the nature of the project vary depending upon the student's current situation, employment, and right-to-work status.

Master's Student Graduate Writing Assessment Requirement

Students need to fulfill the Master's Student Graduate Writing Assessment Requirement before advancing to candidacy. Please refer to page 118 for more information regarding this requirement.

Advancement to Candidacy

The student will advance to Master's Degree candidacy upon the completion of 23 semester credit hours of coursework, satisfying the Graduate Writing Assessment Requirement (GWAR), and approval of a Project Abstract by the student's Advisory Committee. The GWAR may be completed either by an acceptable standardized test score for the Analytical Writing subtest of the GMAT or GRE, or a paper(s) that receive(s) a passing score as described in university policy.

Continuation

Graduate students must maintain an overall GPA of 3.0 and earn at least a C (2.0) in each course, except those taken for credit/no credit. Any student whose overall GPA falls below 3.0 for two consecutive semesters will be dropped from the program. A full-time student should be enrolled in the predetermined course schedule and credit hours each semester for the program. In addition, a project report must be submitted, defended, and approved at the end of the Internship or Semester-In-Residence. In unusual circumstances where project requirements are not completed, defended, and approved at the end of the Internship or Semester-In-Residence, the student may complete the requirements within six months under the guidance of the advisory committee.

BIOT 500 (1)

Preparation for PSM and Bioscience Industry Engagement

Career readiness preparation for successful entry and growth in the biosciences. The course consists of guest leaders from the life science and support community and interactive discussion topics including the business of science, career opportunities, industry and workforce trends, and overview of the biotechnology industry. *Enrollment restricted to MBt student or approval of Program Director.*

BIOT 600 (5)

Genomics and DNA/RNA Technologies

Provides a foundation in basic principles of genomics and relevant current research in recombinant DNA technology. Includes the relationship between structure, function, and content of genes and genomes, the use of bioinformatics and tools used to discover and identify sequence elements. Appreciation for the role of genomics and DNA/RNA technology in modern society will be obtained by dissecting seminal papers. Laboratory reinforces key concepts and introduces fundamental techniques and technologies being applied today. *Enrollment restricted to students who have been admitted to the Master of Biotechnology Program.*

BIOT 620 (3)

Bioengineering and Bioprocessing

Introduction to the theory and application of biotechnology processes for the development of biopharmaceutical and bio-based products. Covers the spectrum of bioprocess engineering, starting from genetic concepts for producing pharmaceutical and other products. The organisms considered range from simple bacteria to highly specialized animal cell cultures. A basic understanding of fundamental bioprocess concepts such as fluid mechanics, mass transfer, unit operations, biochemical reaction kinetics, cell growth and metabolism, heterogeneous reactions, and bioreactor analysis and design. *Enrollment restricted to students who have been admitted to the Master of Biotechnology Program.*

BIOT 630 (3)

Experimental Design and Statistical Analysis in Biotechnology

Introduces advanced statistical concepts and analytical methods for the experimental needs and data encountered in biotechnology and biomedical sciences. Experimental design/conduct, quantitative analysis of data, and statistical inferences and interpretations are studied for scientific hypothesis testing, as well as clinical trials. Explores methodological approaches to bioassay development/testing and provides a foundation for critically evaluating information to support research findings, product claims, and technology opportunities. *Enrollment restricted to students who have been admitted to the Master of Biotechnology Program.*

BIOT 650 (3)

Regulatory Affairs and Quality Management in Life Sciences

Overview of the laws and regulations enforced by the Food and Drug Administration and other regulatory agencies related to the biotechnology, pharmaceutical, and medical device industries. Included is the U.S. legal regulatory system, Food, Drug, and Cosmetic Act and related laws, Freedom of Information Act, regulation affecting foods, drugs, biologics, veterinary products, diagnostics, and devices, FDA enforcement, product liability, and import/export requirements. Reviews the impact of quality systems and the functions, roles, and responsibilities on Quality Assurance and Quality Control. *Enrollment is restricted to students who have been admitted to the Master of Biotechnology Program.*

BIOT 655 (2)

Business Law & Intellectual Property in High Technology Enterprises

Understanding individual and organizational responsibility in commercial biotechnology and the role of intellectual property in a high-technology industry. Business in a legal, social, political, and regulated environment will be explored. Topics include legal principles, contract law, and intellectual property and its protection. *Enrollment is restricted to students who have been admitted to the Master of Biotechnology Program.*

BIOT 660 (2)

Scientific Communication in Industry

Provides insight and practice in the forms of scientific communication including scientific papers, technical reports, presentations, proposals, organizational reporting/reports, and other communication demands found in industry. Students will differentiate between objectives of the various communication purposes and understand key steps and ingredients for effective communication. Emphasizes basic skills for both written and oral communication and provides practice of these principles. *Enrollment is restricted to students who have been admitted to the Master of Biotechnology Program.*

BIOT 670 (2)

The Bioentrepreuneur: Science to Market

The Bioentrepreneur: Science to Market (2). Exposure to the exciting opportunities and unforeseen challenges of developing biotechnology products. Students will learn from successful bioentrepreneurs, the unique aspects of starting, nurturing, growing, and sustaining or exiting a biotech enterprise. Topics will include how to assess a technology product idea, license and protect IP, secure capital, navigate product approval and reimbursement strategies, create biotechnology partnerships, institute biomanufacturing, while maintaining high ethical standards. *Prerequisite: MBt student or approval of Program Director.*

BIOT 675 (2)

Bioscience Beyond the Borders

The course exposes students to the needs of participating in today's global life science enterprise including the interconnection between local and global processes. The course addresses the need for understanding cultures and practices of other countries that impact essential relations, behavior, strategies, values, attitudes to negotiate and conduct international relations. Includes student competency tests and self-development to strengthen one's ability for success in the global environment. *Enrollment is restricted to MBt student or approval of Program Director.*

BIOT 680A (1) BIOT 680B (2)

Semester in Residence Project Writing Workshop

Provides the student with tools and a focused pathway to develop and complete their Semester in Residence Project. This process is imperative to the student's ability to produce a comprehensive final project, defense, and future industry presentations. Units vary according to depth of content and instructional needs. *Enrollment is restricted to students who have been admitted to the Master of Biotechnology Program. This class cannot be repeated.*

BIOT 681A (4) BIOT 681B (5)

Internship/Semester in Residence/Project

Provides industry experience in commercial Research and Development under the guidance of faculty and direct supervision by a company manager. The student will establish/accomplish goals, communicate work/project progress, acquire broad organization insight, and demonstrate core competencies required for the degree. The experience will culminate in a written project document and an oral presentation to fellow students, faculty, and company representatives on assigned work and project. The number of units depends upon project workload. *May not be taken for credit by students who have not received credit for BIOT 680. Enrollment is restricted to students who have been admitted to the Master of Biotechnology Program. Prerequisite BIOT 680A.*

BIOT 697A (1) 697B (2) 697C (3) 697D (4) 697E (5) 697F (6)

Directed Studies

Industrial or academic research directed or sponsored by industry and Professional Science Masters faculty. Enrollment limited to students who have Graduate Standing and who expect to use the facilities and resources of industry or CSUSM. *May be repeated one time. Graded Credit/No Credit. Units may be applied to the required units for the Master's degree. Enrollment restricted to students who have obtained consent of instructor.*

BIOT 699A (1) 699B (2) 699C (3) 699D (4) 699E (5)
699F (6)

Semester in Residence Project Extension

Registration is limited to students who have received a grade or Report in Progress (RP) in BIOT 681A/B and who expect to use the facilities and resources of the University/Industry to work on or complete the project. *May not be repeated more than once. Graded Credit/No Credit. Enrollment Requirement: Prior registration in BIOT 680B with an assigned grade of Report in Progress (RP). Units may not be applied to the required units for the Master's degree. Enrollment restricted to students who have obtained consent of Program/Department-Director/Chair.*

BA 504 (3)

Accounting for Managers

Introduces basic accounting concepts, vocabulary, and structure. Focuses on financial accounting, which seeks to communicate the financial condition and results of operations to external users, primarily through financial statements contained in the annual report. Focuses on a user perspective and will also focus on the accounting choices available to companies and the impact of these choices on financial statements.

BA 506 (2)

Managing Complex Organizations

The study of individual and group behavior in organizational settings. All organizations must function within the context of their internal and external environments. Managing organizational behavior in this context challenges individuals to understand and embrace workforce diversity, elements of change, effective communication, and performance systems. Concepts include motivation, communication, group dynamics, power, conflict, decision making and leadership.

BA 627 (3)

Business Analytics and Project Management

Provides students with variety of business analytics tools and methods to solve complex managerial situations, and skills to work successful in a project environment and accomplish project objectives by explaining concepts and techniques.

CHEM 450 (3)

Protein Structure and Function

Fundamentals of protein structure including structural motifs, domains, and folding; methods of protein structure determination; structural bioinformatics; and an in-depth consideration of the structure-function relationship in representative proteins involved in important biological functions such as transport, enzyme catalysis, protein-nucleic acid interactions, signal transduction, immunity, and membrane channels and receptors.

CHEM 450L (1)

Protein Structure and Function in the Life Sciences (Lab)

The laboratory component will complement the lecture providing experience performing biochemical and molecular techniques used to probe protein structure and function. Commonly used techniques including plasmid DNA extraction, site-directed mutagenesis, bacterial transformation, protein expression and purification, western blots, circular dichromism, and fluorometry will be performed along with genome editing tools and techniques. The laboratory will cover how to maintain a detailed laboratory notebook, write a laboratory report, create a research poster, and present results to diverse audiences using powerpoint.