

The Master of Science Degree in Biotechnology & Bioinformatics (34 - 35 units)

Program Description

The Master of Science in Biotechnology and Bioinformatics is a professional degree program designed to meet the needs of biotechnology industry and related public and private agencies and organizations. The program combines rigorous scientific training in interdisciplinary areas in biotechnology, stem cell technology and bioinformatics with course work and experience in business management and regulatory affairs. The program includes a set of core courses with three emphases to choose from: biotechnology and bioinformatics and stem cell technology and laboratory management, and several elective courses.

Biotechnology is centered in the laboratory and employs sophisticated molecular biology techniques for applications in human and animal health, agriculture, environment, and specialty biochemical manufacturing. In the next century, the major driving force for biotechnology will be the strategic use of the data derived from large-scale genome sequencing projects. Bioinformatics turns raw data from genome sequencing and new experimental methodologies such as microarrays and proteomics into useful and accessible information about gene function, protein structure, molecular evolution, drug targets and disease mechanisms using computational analyses, statistics, and pattern recognition. Stem cell technology and laboratory management introduces the current knowledge and highly specialized technical skills in the stem cell field and trains technical and managerial personnel in stem cell research and development. Our approach also includes team projects drawn from biotechnology industries to focus on real-world problems and applications of biological and computational sciences and to inculcate interpersonal as well as problem-solving skills using multiple perspectives.

Graduates from this program will develop analytical, managerial and interpersonal skills along with sophisticated expertise in biotechnology and bioinformatics. They will be ready to make immediate contributions to scientific research and development, management in biotechnological, biomedical and pharmaceutical industries, biotechnology law and regulations, governmental or environmental agencies, research institutes, consulting firms, research and clinical laboratories, private and public health organizations, or education.

Admission Requirements

1. Applicants must have a BS/BA degree in Biology, Computer Science, Chemistry, Biochemistry, or Mathematics. Alternatively, applicants with a BA/BS degree in any field and equivalent work experiences in one of the above fields may be granted conditional admission, and they must fulfill all conditional requirements before they can be fully classified.
2. Applicants seeking admission to the professional MS in Biotechnology and Bioinformatics program must be officially accepted into the CSUCI academic program.

3. Applicants must declare themselves as graduate students in the professional MS degree program in Biotechnology and Bioinformatics.
4. Applicants for the Stem Cell Technology and Laboratory Management Emphasis must commit to the stem cell technology internship requirement.
5. Applicants will be evaluated by the Program Admissions Committee which will consider the applicants in the context of the total applicant pool using our general admission standards, including all academic work, GPA, test scores, relevant work experience and other factors that may have a bearing on the individual's potential for success. The following materials are required for our evaluation and admission process:
 - Applicants must submit their transcript(s) from their undergraduate institution(s), Graduate Record Examinations (GRE) General and Subject (Biology or Biochemistry, Cell and Molecular Biology) Test scores or the Medical College Admission Test (MCAT) scores. The Subject Test scores are used by the Program Admissions Committee to place students into prerequisite courses when there is a deficiency in the subject area.
 - Applicants who have received their undergraduate degrees from a university where English is not the language of instruction, or have studied fewer than two years at a university where instruction is in English, must submit their Test of English as a Foreign Language (TOEFL) scores for evaluation.
 - Applicants must submit a one page "Statement of Purpose" and two letters of recommendations from people able to judge the applicant's academic capacity.

Degree Requirements

Common Core Courses - 12 units

BINF	500	DNA & Protein Sequence Analysis. . . . .	.3
BIOL	502	Techniques in Genomics & Proteomics . . . . .	.3
BIOL	503	Biotechnology Law and Regulation. . . . .	.3
MGT	471	Project Management . . . . .	.3

Biotechnology Emphasis - 22 units

1. Required Courses - 12 units

BIOL	504	Molecular Cell Biology . . . . .	.3
BIOL	505	Molecular Structure. . . . .	.4
BIOL	600	Team Project. . . . .	.4
BIOL	601	Seminar Series in Biotechnology and Bioinformatics . . . . .	.1

2. Electives - 10 Units

A minimum of ten courses chosen from the following the following courses and/or from the elective courses under the Bioinformatics Emphasis:

BIOL	500	Introduction to Biopharmaceutical Productions . . . . .	.3
BIOL	506	Molecular Evolution . . . . .	.4
BIOL	507	Pharmacogenomics and Pharmacoproteomics . . . . .	.3
BIOL	508	Advanced Immunology . . . . .	.4
BIOL	509	Plant Biotechnology . . . . .	.4
BIOL	510	Tissue Culture Techniques and Stem Cell Technology . . . . .	.3
BIOL	511	Advanced Stem Cell Technology . . . . .	.3

BIOL	512	Advanced Topics in Regenerative Medicine . . . . .	.1
BIOL	513	Cell Culture Facility Management . . . . .	.3
MGT	421	Human Resource Management . . . . .	.3
BIOL	490	Special Topics . . . . .	.1-3

Bioinformatics Emphasis - 23 units

1. Required Courses - 17 units

BINF	501	Biological Informatics . . . . .	.3
BINF	510	Database Systems for Bioinformatics . . . . .	.3
BINF	511	Computational Genomics . . . . .	.3
BINF	513	Programming for Bioinformatics . . . . .	.3
BIOL	600	Team Project. . . . .	.4
BIOL	601	Seminar Series in Biotechnology and Bioinformatics . . . . .	.1

2. Electives - 6 Units

A minimum of two courses chosen from the following and/or from the elective courses under the Biotechnology Emphasis, with at least one course in the BINF category:

BINF	512	Algorithms for Bioinformatics . . . . .	.3
BINF	514	Statistical Methods in Computational Biology . . . . .	.3
BIOL	504	Molecular Cell Biology . . . . .	.3
BIOL	505	Molecular Structure. . . . .	.4
COMP	445	Image Analysis & Pattern Recognition (MATH/PHYS) GE-B1, B4, UDID . . . . .	.3

Stem Cell Technology and Laboratory Management Emphasis 22 - 23 units

1. Required Courses 19 units

BIOL	504	Molecular Cell Biology . . . . .	.3
BIOL	510	Tissue Culture Techniques and Stem Cell Technology . . . . .	.3
BIOL	511	Advanced Stem Cell Technology . . . . .	.3
BIOL	512	Advanced Topics in Regenerative Medicine . . . . .	.1
BIOL	513	Cell Culture Facility Management . . . . .	.3
BIOL	602	Stem Cell Technology Internship . . . . .	.6

2. Electives 3-4 units

A minimum of one course chosen from the elective courses in Biotechnology or Bioinformatics Emphasis.

Graduate Writing Assessment Requirement

Writing proficiency prior to the awarding of the degree is demonstrated by successful completion of BIOL 600 Team Project or BIOL 602 Stem Cell Technology Internship with a grade of B or higher.

The Master of Science Degree in Biotechnology & Masters of Business Administration (72 units)* (Dual Degree)

*Assumes that at least one set of the Foundation Courses listed below has been completed in a business or science undergraduate degree program.

Program Description

The Master of Science in Biotechnology and Master of Business Administration is a dual professional degree program designed to meet the needs of biotechnology industry and related public and private agencies and organizations. The program combines rigorous scientific training in biotechnology with graduate course work and experience in business management and regulatory affairs. The program includes the foundation courses for the dual degree program, a set of graduate level core courses in both biotechnology and business, and several elective courses.

Our approach includes team projects drawn from biotechnology industries to focus on real-world problems and applications of biological sciences and business. We approach interpersonal skills and problem-solving skills from multiple perspectives.

Admission Requirements

1. Applicants must have a BA/BS. degree in Biology, Chemistry, Biochemistry, or Business/ Economics related discipline. Alternatively, applicants with a BA/BS degree in any field and equivalent work experiences in one of the above fields may be admitted and must fulfill the foundation course requirements before taking the core courses and electives in the degree program.
2. Applicants seeking admission to the dual degree program must be officially accepted into CSUCI as graduate students.
3. Applicants must declare themselves as graduate students in the dual degree program.
4. Applicants will be evaluated by the Program Admissions Committee which will consider the applicants in the context of the total applicant pool using our general admission standards, including all academic work, GPA, test scores, relevant work experience and other factors that may have a bearing on the individual's potential for success. The following materials are required for our evaluation and admission process:
 - Applicants must submit their transcript(s) from their undergraduate institution(s) and Graduate Record Examinations (GRE) General and Subject (Biology or Biochemistry, Cell and Molecular Biology) Test scores. The Subject Test scores are used by the Program Admissions Committee to place students into prerequisite courses when there is a deficiency in the subject area.
 - Applicants who have received their undergraduate degrees from a university where English is not the language of instruction, or have studied fewer than two years at a university where instruction is in English, must submit their Test of English as a Foreign Language (TOEFL) scores.

- Applicants must submit a one page "Statement of Purpose" and two letters of recommendations from people able to judge the applicant's capacity for both academic and professional success.

Degree Requirements

Required Foundation Courses - 16 units

1. Required Foundation Courses in Biology and Chemistry for Students without a B.S. in Biology or Chemistry - 16 units

CHEM	110	Chemistry of Life . . . . .	.4
BIOL	201	Principles of Cell and Biology . . . . .	.4
BIOL	300	Cell Biology . . . . .	.4
BIOL	400	Molecular Biology 4	

2. Required Foundation Courses in Business/Economics for Students without a B.A./B.S. in Business or Economics or a Related Discipline 16 units

BUS	500	Economics for Managers . . . . .	.3
BUS	502	Quantitative Methods for Decision-Making . . . . .	.3
BUS	504	Introduction to Accounting and Finance . . . . .	.4
BUS	506	Principles of Management and Marketing . . . . .	.3
BUS	508	Business Ethics and Law . . . . .	.3

Core Courses

Common Required Courses in the Dual Degree Program - 9 units

MGT	471	Project Management . . . . .	.3
BIOL	610	Capstone Project for MS/MBA Dual Degree (BUS) . . . . .	.6

Required Courses in the Master of Science in Biotechnology - 23 units

1. Required Core Courses - 16 units

BINF	500	DNA & Protein Sequence Analysis . . . . .	.3
BIOL	502	Techniques in Genomics/Proteomics . . . . .	.3
BIOL	503	Biotechnology Law and Regulation . . . . .	.3
BIOL	504	Molecular Cell Biology . . . . .	.3
BIOL	510	Tissue Culture Techniques and Stem Cell Technology . . . . .	.3
BIOL	601	Seminar in Biotechnology and Bioinformatics . . . . .	.1

2. Elective Courses - 7 units

A minimum of seven units from the elective courses in MS Biotechnology and Bioinformatics program.

Required Courses in the Master of Business Administration - 24 units

1. Required Core Courses - 18 units

BUS	510	High Performance Management . . . . .	.3
BUS	520	Strategy and Leadership . . . . .	.3
BUS	530	Managing Business Operations . . . . .	.3
BUS	540	Financial Reporting and Analysis . . . . .	.3
BUS	550	The Contemporary Firm . . . . .	.3
BUS	560	The Entrepreneurial Manager . . . . .	.3

2. Elective Courses - 6 units

Double-counted courses:

BINF	500	DNA & Protein Sequence Analysis . . . . .	.3
BIOL	503	Biotechnology Law and Regulation . . . . .	.3

Graduate Writing Assessment Requirement

Writing proficiency prior to awarding of the degree is demonstrated by successful completion of BIOL 610 Capstone Project for MS/MBA Dual Degree with a grade of B or higher.