**Biotechnology**

**Master of Science in Biotechnology (M.S.B.) Degree**

**DEGREE INFORMATION**

**Priority Admission Application Deadlines:**

**Fall:** June 1

**Spring:** October 15

**Summer** February 15

International applicant deadlines:

<http://www.grad.usf.edu/majors>

In select cases, late admission is possible.

**Minimum Total Hours:** 36

**Level:** Masters

**CIP Code:** 26.1201

**Dept Code:** MED

**Major/College Codes:** MSB MD

**Approved:** 2007

**CONTACT INFORMATION**

**College:** Medicine

**Department:** Molecular Medicine

**Contact Information:** [www.grad.usf.edu](http://www.grad.usf.edu/) biotech@health.usf.edu

**Other Resources:**

**Website:**

<http://health.usf.edu/medicine/graduatestudies/biotechnology>

**MAJOR INFORMATION**

The USF Master’s Degree Program in Biotechnology represents a multi-college partnership and a truly interdisciplinary collaboration. Participating colleges include the Morsani College of Medicine, the College of Engineering, the College of Public Health, the College of Arts and Sciences and the College of Business Administration. The major is designed to meet the increasing demand for trained people in this exploding area, which crosses the traditional fields of biological, chemical, engineering, health and computer sciences. The curriculum has been designed accordingly and provides the theoretical background, the practical training and, with the internships, the “real life” experience, which will equip students with the essential tools for a successful career in the field of biotechnology. In 2008, the USF Biotechnology major was recognized by the Council of Graduate Schools as **Professional Science Master’s Program**. Graduates take jobs in the Biotechnology Industry or move on to a Ph.D. Degree Program, Medical School, Dental School, Veterinary School or Pharmacy School.

**ADMISSION INFORMATION**

Must meet University requirements (see Graduate Admissions) as well as requirements for admission to the major, listed below. The USF Biotechnology major will be available for full -time and part-time enrollment. In order to be considered for admission to the Master's degree program in Biotechnology, applicants must fulfill the following requirements:

**Administrative Pre-Requirements:**

* A bachelor's degree
* A minimum undergraduate GPA of 3.00 on a 4.00 scale
* A GRE test score \*
* Two letters of recommendation
* Statement of purpose, indicating how the major would suit the student's interests and serve his/her professional goals
* Complete transcripts of undergraduate work and any previous graduate work
* International students need a course-by-course transcript evaluation, see [Office of Admissions](http://www.usf.edu/admissions/international/admission-information/graduate/requirements-and-deadlines.aspx)
* A completed USF Application to Graduate Studies

\*The GRE may be waived in special circumstances where the applicant can demonstrate substantial graduate level experience. This experience can include (but is not limited to) a post-graduate degree, 2-3 years of research and/or development experience in an academic or industrial settings, or participation in research projects leading to published papers. The decision on the waiving of GRE will be at the Graduate Director’s discretion. **Major Pre Requirements:**

A good foundation in biochemistry, molecular biology and genetics, i.e. a bachelor's degree in either the biological or chemical sciences or at least one year of studies in those disciplines would be the optimal preparation for admission to the major in Biotechnology. However, the faculty of the USF Biotechnology major is aware that not all applicants who are interested in pursuing this degree will have this formal background. Instead, some might have accumulated substantial knowledge in one of these disciplines during their work as laboratory technicians, engineering assistants or environmental or public health service providers. Those students would be ideally suited to start their graduate education with a Graduate Certificate in Biotechnology that is also offered by the Department of Molecular Medicine in the Morsani College of Medicine.

<http://www.usf.edu/innovative-education/programs/graduate-certificates/biotechnology.aspx>

The Biotechnology Graduate Certificate Degree has less stringent entrance requirements (a GRE is not required) but its successful completion will serve several purposes:

* it will provide the students with a certificate of advanced studies independent of prospective additional studies in the Biotechnology major,
* it will fulfill certain pre requirements for admission into the Biotechnology major,
* 12 credit hours of the Biotechnology Certificate can be transferred into the major.

**CURRICULUM REQUIREMENTS**

**Total Minimum Hours 36 credit hours**

Core – 21 credit hours

Electives – 12 credit hours

Internship – 3 credit hours

The Master’s Degree Program in Biotechnology is designed for 36 credit hours, which can be obtained in 3 semesters of study. The major will be available for full-time and part-time enrollment. Twenty-four credits of core courses will provide the foundation and basics and include an internship. Twelve credits of electives allow the curriculum to be tailored to the individual student’s background, interests and career goals.

The core courses include introductory courses in biochemistry, molecular and cellular biology, introduction to biotechnology, biotechnology and bioethics, translational Biotechnology and a seminar on current topics in biotechnology. Most of these courses are part of the current graduate curricula in the involved colleges. Student will choose from available graduate electives that are contributed by five participating colleges. The electives are organized in four different categories i.e. science, engineering, public health and business/law and the students will be free to select according to their interests and career plans.

Students must maintain an overall average of 3.00 (“B”)

**CORE REQUIREMENTS – 21 hours**

GMS 7930 Basic Principles in Molecular Medicine Sec I & II 4cr

BCH 6135C Methods in Molecular Biology 4cr

BSC 6436 Intro to Biotechnology 3cr

EIN 6106 Technology and Law 3cr

GMS 6847 Translational Biotechnology 3cr

BSC 6437 Biotechnology and Bioethics 3cr

GMS 6194 Biotech Forum 1cr

*Students who can demonstrate significant prior training in any required course, can at anytime during their studies, with written department approval, replace a course with an elective.*

**Electives - 12 hours**

Students may select from the lists below, or other courses based on availability and approval by the Graduate Director.

**Science:**

GMS 6773 Stem Cells in Brain Repair 3

GMS 6513 Principles of Pharmacology and Therapeutics 3

GMS 6771 Aging and Neuroscience 3

GMS 6114 Vaccines and Applied Immunology 2

GMS 7939 Graduate Seminar 1

GMS 6141 Basic Medical Microbiology/Immunology 3

GMS 6115 Medical Parasitology and Mycology 3

GMS 6110 Microbial Pathogenesis and Host parasite interactions 3

BCH 6746 Structural Biology 3

GMS 6103 Foundations in Med Microbiology & Immunology 4

GMS 7930 Applied Bioinformatics 3

BCH 6627 Molecular Basis of Disease 4

GMS 6101 Molecular Cellular Immunology 3

GMS 6012 Basic Medical Genetics 3

GMS 6107 Advances in Virology 2

BCH 6886 Fundamentals of Structural Bioinformatics 4

GMS 7930 Python Programming 3

GMS 7930 FDA Regulations 2

GMS 7910 Directed Research 1-4

**Engineering**:

BMD 6931 Intro to Bioengineering 3

BME 6000 Biomedical Engineering I 3

BME 6931 Biomedical Engineering II 3

BME 6107 Biomaterials I: Material Properties 3

BME 6108 Biomaterials II: Biocompatibility 3

BME 6634 Biotransport Phenomena 3

ECH 6417 Bioseparations 3

ECH 5740 Theory and Design of Bioprocesses 3

BME 5040 Pharmaceutical Engineering 2

ENV 6667 Environmental Biotechnology 3

**Public Health:**

PHC 6310 Environmental Occupational Toxicology 3

PHC 6050 Biostatistics I 3

PCH 6051 Biostatistics II 3

PHC 6000 Epidemiology 3

PHC 6017 Design and Conduct of Clinical Trials 3

**Business/Law:**

ENT 6186 Strategic Market Assessment for New Technologies 3

ENT 6016 New Venture Formation 3

ENT 6116 Business Plan Development 3

ENT 6126 Entrepreneurship Strategy

ENT 6415 Fundamentals of Venture Capital and 3

 Private Equity in Entrepreneurship

GMS 6095 Principles of Intellectual Property 3

GMS 6933 Case Studies: Intellectual Property in Biotechnology 2

**Comprehensive Exam/Internship**

**:**

As an alternative to a Master's Comprehensive Exam, biotechnology Master's students will have to complete a practical internship and theoretical assignment which will both require the successful application of the knowledge they have acquired during their formal training. Required are:

* an internship with a written and an oral internship report and
* a review paper providing an overview of recent advancements in an area of biotechnology of the student's choice.

**SEQUENCE**

Required Courses:

**Fall Semester 11** **hours**

GMS 7930 Basic Principles in Molecular Medicine Set I & II 4

BSC 6436 Introduction to Biotechnology 3

BCH 6135C Methods in Molecular Biology 4

**Spring Semester 7** **hours**

GMS 6194 Biotech Forum 1

GMS 6847 Translational Biotechnology 3

EIN 6106 Technology and Law 3

**SUMMER 6 hours**

GMS 6943 Biotechnology Internship (all semesters) 3

BSC 6437 Biotechnology and Bioethics 3

**COURSES**

For more information on individual courses, please see <http://ugs.usf.edu/course-inventory> or contact the department directly: biotech@health.usf.edu