

# BIOTECHNOLOGY AND CHEMICAL SCIENCE, MS

The Master of Science degree in Biotechnology and Chemical Science (BTCS) prepares students for technical and managerial careers in various applied science industries, including food science, biopharmaceuticals and clinical diagnostics, or for advanced study. It is an interdisciplinary program where a student may concentrate in biotechnology or biotech management (through a partnership with the College of Business). The program is appropriate for students holding a bachelor's degree in biology, biochemistry, chemistry and related fields, or those with other bachelor's degrees who have completed the prerequisite coursework. Applicants preparing for careers in healthcare or research are encouraged to apply for the Master of Arts in Biomedical Science, the Master of Science in Biology or the Master of Science in Integrated Biomedical Science at Roosevelt University.

Students in the program receive:

- Theoretical and practical training through a rigorous, comprehensive graduate curriculum including chemistry, biology, biochemistry, and business coursework.
- Direct experience with laboratory techniques and methods used in commercial and academic settings.
- Internship, networking and career exploration opportunities that enhance students' skills and prepare them to enter their chosen field.
- Individual advising and mentoring by experienced faculty.

Coursework for this program is regularly offered during afternoon and evening hours and on weekends, allowing working students to extend their professional training.

## Admission

Applicants should consult the graduate admission resources on the Roosevelt University website for information on the application process. The graduate program director and department faculty members will evaluate each applicant's individual record of academic achievement and professional experience. Weakness in one or more areas of preparation will not preclude a positive admission decision. Admissions decisions are at the discretion of the graduate program director or department chair.

## APPLICATION MATERIALS

### REQUIRED DOCUMENTS

- **Graduate application:** Application (<https://www.roosevelt.edu/admission/apply/>) to the College of Science, Health and Pharmacy at Roosevelt University.
- **Transcript(s):** Unofficial transcripts from all undergraduate and graduate institutions attended. International applicants must submit official transcripts, and all applicants must have official transcripts on file before starting graduate studies.
- **Proof of English language proficiency (for international students):** See the University English Language Proficiency requirement (<https://www.roosevelt.edu/admission/international/english-language-proficiency/>) for details. Applicants can receive an admissions decision if this requirement is not met, but may need additional support as they begin graduate studies.

### OPTIONAL DOCUMENTS

- **Resume/Curriculum vita:** A detailed account of academic and extracurricular experiences. Include employment, teaching, leadership, and research experiences as appropriate.
- **Letter of intent:** A brief (one-page) personal statement which outlines personal and professional goals.
- **Letter of recommendation:** Referees may include professors, academic advisors, employment supervisors, or others familiar with the applicant's preparation for graduate study.
- **Official GRE, MCAT, PCAT or DAT score:** Official score in one of the graduate admissions tests that are no more than three years old.

## Prerequisites

Applicants to the MS BTCS program must hold a bachelor's degree with a minimum cumulative GPA of 2.75 (4.0 scale) and have completed the academic requirements described below.

- **Biotechnology concentration:** General Chemistry, Organic Chemistry, Physics, Cellular/Molecular Biology
- **Biotechnology Management concentration:** *Same as Biotechnology, plus* - Statistics (business statistics or biostatistics)

Students lacking prerequisite coursework may be admitted provisionally until outstanding courses have been completed satisfactorily (grade of B- or better). None of the prerequisite courses may be used toward fulfillment of the requirements for the master's degree.

## Credit Policies

Graduate transfer credit (up to 9 credit hours) may be applied to the MS Biotechnology and Chemical Science degree within one semester of admission. *Credits from a previously earned degree are not transferable.* Exceptions to specific course requirements may be granted to students who have previously completed graduate coursework in a related area and maintain good academic standing after one semester of study at Roosevelt. All transfer credits and exceptions must be approved by the graduate program director or department chair.

## Advising

New students must consult with a graduate advisor upon admission to the program. Each graduate student must meet with an advisor at least once each semester to select appropriate courses for the following semester. Continuing students who have completed at least one semester of graduate study (or 6 credit hours) with a grade average of 3.0 or higher should consult with their advisors to discuss internship, independent study and other experiential learning opportunities.

## Requirements

The Master of Science degree in Biotechnology and Chemical Science requires a minimum of 36 credit hours, at least 27 of which must be completed at Roosevelt University. Each student will develop an academic plan in consultation with a faculty advisor. Students may choose concentrations in Biotechnology or Biotechnology Management (in conjunction with Roosevelt's College of Business). See the list below for required and recommended courses in each concentration.

## INTERDISCIPLINARY AND REQUIRED COURSEWORK

- **Biotechnology concentration:** BIOL 480 APPLICATIONS OF BIOTECHNOLOGY, BIOL 482 BIOTECHNOLOGY INDUSTRY PRACTICE, BCHM#493#BIOCHEMISTRY SEMINAR, at least three laboratory courses and three credit hours of research or independent study are required for this concentration (see details below). At least 9 elective

credit hours in Biology and 9 elective credit hours in Biochemistry and/or Chemistry are required for degree completion.

- **Biotechnology Management concentration:** BIOL 480 APPLICATIONS OF BIOTECHNOLOGY, BIOL 482 BIOTECHNOLOGY INDUSTRY PRACTICE, BCHM#493#BIOCHEMISTRY SEMINAR, four courses in Management, at least one laboratory course and one Professional Development course are required. At least 11 elective credit hours in Biology, Biochemistry and/or Chemistry are required for degree completion.

## RESEARCH AND INDEPENDENT STUDY OPPORTUNITIES

All students in the Biotechnology concentration must complete at least three credit hours of research or independent study through enrollment in the Research Methods course (BIOL#468#RESEARCH METHODS) or through individualized registration for Independent Study in literature research (BIOL#495#INDEPENDENT STUDY), Internship (BIOL#491#BIOLOGY INTERNSHIP), or Research under the sponsorship of a faculty member (BIOL#492#RESEARCH IN BIOLOGY/ BCHM#492#RESEARCH IN BIOCHEMISTRY/ CHEM#492#RESEARCH IN CHEMISTRY). Individualized registration may be undertaken for 3 credit hours in a single term, or in increments to total 3 credit hours over sequential terms. No more than 10 total credit hours from individualized registration may be applied to the degree, unless approved by the graduate program director.

Students in the Biotechnology Management concentration may enroll in up to 6 credit hours of individualized registration for Independent Study in literature research (BIOL#495#INDEPENDENT STUDY/ BCHM#495#INDEPENDENT STUDY/ CHEM#495#INDEPENDENT STUDY) or Internship (BIOL#491#BIOLOGY INTERNSHIP).

## RECOMMENDED COURSES

The coursework for the degree will be chosen from the list below, from other scheduled courses ([https://banner.roosevelt.edu/ssbprod/bwskzenr.P\\_CourseFinder/](https://banner.roosevelt.edu/ssbprod/bwskzenr.P_CourseFinder/)) in BIOL, CHEM or BCHM at the 400-level or through individualized registration as described above.

## Biotechnology Concentration

Code	Title	Credit Hours
<b>Industry (required)</b>		<b>7</b>
BIOL 480	APPLICATIONS OF BIOTECHNOLOGY	
BIOL 482	BIOTECHNOLOGY INDUSTRY PRACTICE	
BCHM 493	BIOCHEMISTRY SEMINAR	
<b>Research and Professional Development (1 required)</b>		<b>3</b>
BIOL 468	RESEARCH METHODS	
BIOL 492	RESEARCH IN BIOLOGY	
	or BCHM 492#RESEARCH IN BIOCHEMISTRY	
	or CHEM 492#RESEARCH IN CHEMISTRY	
BIOL 491	BIOLOGY INTERNSHIP	
BIOL 495	INDEPENDENT STUDY	
<b>Electives</b>		
Biology (minimum 9 credits, including 1 lab)		
BIOL 418	BIOSTATISTICS	
BIOL 425	VIROLOGY	
BIOL 450	CANCER BIOLOGY	
BIOL 451	GENERAL GENETICS	
BIOL 453	MOLECULAR BIOLOGY	

BIOL 458	CELL BIOLOGY
BIOL 460	MICROBIOLOGY
BIOL 463	INTRODUCTION TO GENOME ANALYSIS
BIOL 467	IMMUNOLOGY
BIOL 483	SPECIAL TOPICS IN BIOLOGY
Chemistry and Biochemistry (minimum 9 credits, including 1 lab)	
CHEM 413	ADVANCED ORGANIC CHEMISTRY
CHEM 436	ANALYTICAL CHEMISTRY
CHEM 452	MEDICINAL CHEMISTRY
BCHM 420	PHYSICAL CHEMISTRY FOR BIOSCIENCE
BCHM 422	FERMENTATION SCIENCE
BCHM 444	BIOINORGANIC CHEMISTRY
BCHM 455	BIOCHEMISTRY
BCHM 456	EXP. MTHDS BIOCHEM & BIOTECH
BCHM 457	ADVANCED BIOCHEMISTRY

List of electives subject to change - consult graduate advisor for details

**Total Credit Hours** **36**

## Biotechnology Management Concentration

Code	Title	Credit Hours
<b>Industry (required)</b>		<b>7</b>
BIOL 480	APPLICATIONS OF BIOTECHNOLOGY	
BIOL 482	BIOTECHNOLOGY INDUSTRY PRACTICE	
BCHM 493	BIOCHEMISTRY SEMINAR	
<b>Management (4 required)</b>		<b>12</b>
ACCT 405	ACCOUNTING FOR EXECUTIVES	
MKTG 406	MARKETING STRATEGY: THEORY & PRACTICE	
MGMT 407	EXECUTIVE LEADERSHIP	
	or ORGD 425#LEADERSHIP THEORIES AND APPLICATION	
FIN 408	FINANCE FOR DECISION MAKERS	
<b>Professional Development (1 required)</b>		<b>3-6</b>
BIOL 491	BIOLOGY INTERNSHIP	
BIOL 495	INDEPENDENT STUDY	
<b>Electives (minimum 11 credits, including at least one lab)</b>		<b>11-14</b>
BCHM 422	FERMENTATION SCIENCE	
BIOL 453	MOLECULAR BIOLOGY (required)	
BIOL 425	VIROLOGY	
BIOL 458	CELL BIOLOGY	
BIOL 460	MICROBIOLOGY	
BIOL 467	IMMUNOLOGY	
BIOL 483	SPECIAL TOPICS IN BIOLOGY	
BCHM 455	BIOCHEMISTRY	
BCHM 456	EXP. MTHDS BIOCHEM & BIOTECH	
BCHM 457	ADVANCED BIOCHEMISTRY	
BIOL 451	GENERAL GENETICS	
CHEM 436	ANALYTICAL CHEMISTRY	
CHEM 452	MEDICINAL CHEMISTRY	

Additional courses may apply - consult graduate advisor for details

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**Total Credit Hours 33-39**

The degree map is a *general* guide to each term on the academic pathway to the MS Biotechnology & Chemical Science degree. It is based on the most current scheduling information and assumes full-time study (although part-time study is allowed in this program). This degree map is reviewed annually and updated as schedules change. Students retain the same course requirements as when they first enroll, as long as they are continuously enrolled in the program. No more than two grades of C (not C-) may be applied toward the 36 hours used for the degree. A graduate course can only be repeated once; no more than two courses can be repeated.

*Please note: always work closely with your academic advisor to understand curriculum requirements and scheduling, as each student's academic plan will look different.*

#### Year 1

Fall	Credit Hours Spring	Credit Hours
BIOL 480	3 BIOL 482	3
BCHM 493	1 BIOL 4XX w/ Lab	5
BIOL 4XX w/ Lab	5 BCHM 4XX	3
	<b>9</b>	<b>11</b>

#### Year 2

Fall	Credit Hours Spring	Credit Hours
BIOL 468, 492, BCHM 492, or CHEM 492	3 BIOL 4XX w/ Lab	5
CHEM 4XX	3 BCHM 4XX	3
BCHM 4XX	3	
	<b>9</b>	<b>8</b>

**Total Credit Hours 37**

The degree map is a *general* guide to each term on the academic pathway to the MS Biotechnology & Chemical Science degree. It is based on the most current scheduling information and assumes full-time study (although part-time study is allowed in this program). This degree map is reviewed annually and updated as schedules change. Students retain the same course requirements as when they first enroll, as long as they are continuously enrolled in the program. No more than two grades of C (not C-) may be applied toward the 36 hours used for the degree. A graduate course can only be repeated once; no more than two courses can be repeated.

*Please note: always work closely with your academic advisor to understand curriculum requirements and scheduling, as each student's academic plan will look different.*

#### Year 1

Fall	Credit Hours Spring	Credit Hours
BIOL 480	3 BIOL 482	3
BCHM 493	1 ACCT 405	3
BIOL 4XX	5 BCHM 4XX	3
	<b>9</b>	<b>9</b>

#### Year 2

Fall	Credit Hours Spring	Credit Hours
MKTG 406	3 BIOL/BCHM/ CHEM 4XX	3
MGMT 407	3 FIN 408	3
BIOL 4XX	3 BIOL 495 or 491	3
	<b>9</b>	<b>9</b>

**Total Credit Hours 36**