

**The Division of Translational Science
Rush Medical College
Rush University**

Master of Science in Biotechnology

Program Manual

FALL 2024

Program Director Edward Barker, Ph.D.

Program Terminal Objectives

Master of Science in Biotechnology

The program's primary objective is to provide science-based biomedical technology training to cultivate research professionals who can seamlessly integrate into a biomedical research laboratory or pursue advanced studies in medical and biomedical programs.

Goal 1: Build strong knowledge in basic biomedical sciences

Student Learning Outcomes: By the program's conclusion, students will have the capacity to elucidate and examine the molecular underpinnings of life within living organisms. (GCC 516 and one of the following: GCC 611, IMM 507, GCC 519, or BMC 500)

Goal 2: Build competence in essential laboratory methods in biotechnology

Student Learning Outcomes: By the program's conclusion, students will have acquired the requisite technical proficiency to execute and evaluate experiments autonomously. (BTN 531-534)

Goal 3: Develop basic research skills

Student Learning Outcomes: By the end of the program, students will be able to:

1. Develop research strategies and apply the theoretical knowledge acquired in classes and the methodology obtained in the laboratory to solve research problems ethically. (BTN 537, GCC 516, BTN 531-534, BTN 525, GCC 506, GCC 546, GCC 548, and one of the following GCC 611, IMM 507, GCC 519, or BMC 500)
2. Effectively communicate scientific discoveries and comprehend and utilize scientific literature as a foundation for hypothesis-driven research. (BTN 537, GCC 900, BTN 540, BTN 541)

Policies and Procedures

Master of Science in Biotechnology

Please refer to the additional Policies and Procedures in the Rush University Catalog and the Rush University website for university-level policies. <http://catalog.rush.edu/index.php>

1. Program Accreditation

Rush University has undergone a comprehensive approval process to offer a Master of Science degree in Biotechnology, which has been approved by the State of Illinois Board of Higher Education. The Higher Learning Commission of Colleges and Schools, known for its meticulous evaluation, also includes this program in Rush University's usual accreditation process.

2. Program Description

The Biotechnology Program aims to instruct graduate-level introductory science courses and to train students in biomedical research technology. The requirements for the Master of Science degree will be met within a two-semester enrollment of 34 semester hours. Typically, all students follow the same curricular plan, beginning in the Fall Semester. The students will start a Research Capstone (BTN 537) in the Fall and must complete it at the end of the Spring Semester.

3. Student Performance Requirements

a. Class attendance

Although attendance in lecture courses is not required, it is strongly advised. Grades for these courses will be determined by completing assignments and examinations. All laboratory courses, BTN 531-537, and other performance-based courses, BTN 540, BTN 541, GCC 900, GCC 506, and BTN 525, require on-time attendance. Grading is accomplished by evaluating student participation and performance daily and by assignments, presentations, quizzes, and written examinations.

b. Grading

Letter grades of A, B, C, and F can be earned in all courses. A “B” or better letter grade must be maintained for the average of all graded coursework during the two semesters.

Core Courses (GCC 516, GCC 546, GCC 548, GCC 506, BTN 525) and elective courses (GCC 611, GCC 519, IMM 507, and BMC-500) and skill-developing courses (BTN 540, 541, and GCC 900) as well as the Capstone course (BTN 537) will be graded by examining your knowledge learned and applying the knowledge gained throughout these courses. Laboratory theory and practice courses, such as BTN 531, BTN 532, BTN 533, and BTN 534, will be graded as learning and acquiring skills and evaluated daily during each class session. Students will continue demonstrating their ability to instructors until the performance is acceptable. In some cases, examination by written tests and oral presentations may be included. A letter grade will also be assigned for each of these courses.

c. Consequences of Failure

More time is needed to correct failures. Therefore, the student must try to achieve passing and B-level performance. There are no make-up exams offered to correct for a C grade. A letter grade of A can compensate for a “C” grade in another course with the same credit value. A grade point average 3.0 must be kept for good academic standing and graduation from the program. Failure to attend or perform in a laboratory course will require an individual arrangement to demonstrate acceptable performance to the instructor or course director. Multiple failures may interrupt the student’s progress in the program, according to the determination of the Biotechnology Program Director with the advice of the Division of Translational Science Advisory Committee. Each case of impaired performance will be considered individually.

d. The Status of “Good Academic Standing”

Each semester, the Program Director interviews the students. These one-on-one meetings discuss academic progress, concerns, and future plans. These meetings may be more frequent if needed. All students who maintain a B letter grade average while completing the required course sequence with full-time enrollment will be considered in “Good Academic Standing” within the Division of Translational Science and eligible for graduation with the M.S. degree.

Any student who fails to maintain a B-letter average will be considered “In Academic Difficulty” until the deficiency is corrected. The Biotechnology Program Director will determine those requirements with the advice of the Division of Translational Science Advisory Committee. A student “In Academic Difficulty” is not eligible for graduation.

e. Course Evaluation

All courses will offer a student-based course evaluation, which is voluntary and anonymous yet very valuable for program development. You will also be invited to complete a graduation survey and exit interview at the end of the Spring Semester. Your comments will be kept in confidence. Your suggestions are taken seriously and used to shape future offerings of this program.

f. Graduation Requirements

All students in “Good Academic Standing” who plan to graduate should register for the semester they plan to graduate and complete all program requirements.

Curriculum 2024-2025

Master of Science in Biotechnology

The Division of Translational Science offers a two-semester, non-thesis master's degree program to prepare students for a research career in the pharmaceutical and biotechnology industries or the university laboratory. This program is also an excellent preparation for additional graduate-level training toward a Ph.D., M.D., D.D.S., PharmD, or other advanced degrees.

Coursework for this program is provided in the attached Table, which contains the course titles and numbers. Biotechnology students will take the Graduate College Core Curriculum series of molecular biology, genetics, and cell and tissue biology. Additional courses are explicitly designed to prepare the student for competency in research and a career in the laboratory; these include Research Ethics, Biomedical Statistics, Bioinformatics, and Experimental Design and Data Management in Research.

At the center of this program is the series of hands-on laboratory courses designed to cover the essential techniques and methods employed in biomedical research today. These laboratory experiences ensure proficiency in various techniques, making students highly competitive in this ever-changing and understaffed job market.

The program culminates in a capstone research experience, where students use their combined theoretical and practical knowledge to complete a small research project.

Coursework for BTN MS program 2024-25

2024-25	CrH	Course Director	Students
Total CrHs 34			
Year 1 Fall			
BTN - 531 Laboratory Techniques I	2	Carl Maki	BTN
BTN - 532 Laboratory Techniques II	2	Joao Mamede	BTN
GCC-537 Capstone research	2	Edward Barker	BTN
GCC-516 Foundations in Biomedical Sciences	7	Jitesh Pratap Joao Mamede	BTN, IBS/MS, IBS/PhD
GCC-546 Principles of Biostatistics I	2	Sanjib Basu	BTN, IBS/MS, IBS/PhD, CRES
GCC-548 Bioinformatics I	1	Carlos Santos	BTN, IBS/MS, IBS/PhD, CRES
GCC-506 Biomedical Ethics	1	Josefina Ramos-Franco	BTN, IBS/MS, IBS/PhD (CRES)
BTN-525 Experimental Design and Models in Disease	2	Christopher Forsyth	BTN, IBS/MS, IBS/PhD
CrH	19		
Year 1 Spring			
BTN - 533 Laboratory Techniques III	2	Jitesh Pratap	BTN
BTN - 534 Laboratory Technique IV	2	Jeffrey Oswald	BTN
BTN - 537 Research Capstone	2	Edward Barker	BTN
GCC-900 Independent Study:	1	Edward Barker	BTN
BTN-540 Experiential Learning	2	Edward Barker	BTN
BTN-541 Pre-professional Development	3	Edward Barker	BTN
Choose 1 from the following:			
GCC- 611 Cancer Biology I	3	Carl Maki	BTN, IBS/MS, IBS/PhD
IMM-507 Basic Immunology	3	Amanda Marzo	BTN, IBS/MS, IBS/PhD
GCC-519 Intro to Neuroscience	3	Brian David	BTN, IBS/MS, IBS/PhD
BMC-500 Musculoskeletal Biology	3	Frank Ko	BTN, IBS/MS, IBS/PhD
CrH	15		

Faculty Roster

Master of Science in Biotechnology

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