

## Student Handbook: Masters of Science degree Program

### Biochemistry & Biotechnology

<http://www.umsl.edu/~biotech/>



View of the Science Complex across Bugg Lake.

**Welcome to the BCBT Master of Science degree program! This handbook contains information about our faculty and for planning your degree. If you have additional questions, please feel free to email [bcbtinfo@umsl.edu](mailto:bcbtinfo@umsl.edu) or contact your graduate advisor.**

## **Biochemistry & Biotechnology (BCBT) Masters of Science Degree Program**

Biochemistry & Biotechnology is a stand-alone Degree Program within the Graduate School at UM-St. Louis. All faculty members that participate in BCBT have primary appointments either in the Department of Biology or in the Department of Chemistry & Biochemistry. They teach and operate research labs within their home department, but come together as a specialized unit to offer the MS and BS in BCBT degrees. This ensures that the BCBT students receive instruction from the most appropriate faculty without any inter-departmental barriers. The result is an integrated, interdisciplinary program that serves the instructional needs of the BCBT students.

Please note, we offer only an MS degree in “Biochemistry & Biotechnology”. We do not offer two separate degrees, one in biochemistry and another in biotechnology. Students interested in a doctoral degree are encouraged to complete their MS degree and apply to the [Ph.D. program in Biology](#), with an emphasis in molecular biology, or to the [Ph.D. program in Chemistry](#), with an emphasis in biochemistry.

### **The Science Complex**

The BCBT program resides in the Science Complex. This building consists of five distinct sections. From west to east, these are the Center for Nanoscience, Benton Hall, Research Wing, the Student Learning Building (SLB), and Stadler Hall. These units were constructed at different times. In the early days, Benton and Stadler Halls were separate buildings. Although each of these units have now been joined into the Science Complex, the sections each retain their original names, so each wing is often referred to as if a separate building.

The BCBT faculty members all have offices in the Science Complex. All the room numbers start with a letter, which denotes its location within the Science complex.

Sxxx = Stadler Hall

Rxxx = Research Wing

Bxxx = Benton Hall

M (or N) xxx = Center for Nanosciences (CNS)

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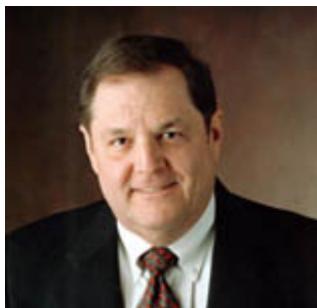
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### **Admission Requirements.**

Applicants must submit a completed application form and transcripts of all previous coursework to the Graduate School. International applicants whose native language is not English must submit TOEFL scores. Applicants must have a bachelor's degree in biology, chemistry, biochemistry, or a similar field from an accredited institution, with a minimum gpa overall and in biology/chemistry courses of 3.0 (on a 4.0 scale), and must have completed biochemistry, genetics, cell biology, and organic chemistry.

## Requirement Term

The semester in which you enter the program establishes your “requirement term”. You are entitled to graduate under the rules and degree requirements that are in effect in your requirement term. A student can look up his/her requirement term in [MyView](#) under **Student Program/Plan**. The official rules for each term are defined by the BCBT pages in the UM-St. Louis Bulletin for each academic year. Copies of the Bulletin for the current year and previous years can be found at <http://www.umsl.edu/bulletin/>.

The BCBT program routinely allows MS students the option, at their discretion, to graduate under the rules in place at the time they graduate. For example, if the BCBT program adds a new elective course, students already in the program will be allowed to take the new course and count it as an elective.

## Degree Requirements

### Non-Thesis MS students.

The MS in BCBT requires 30 credit hours of coursework: 15 credit hours of required core courses plus 15 credit hours of electives. The list of core and elective courses is shown in **Table 1**. The non-thesis program includes a mix of full-time and part-time MS students. Many students are working full time and adjust their course load each semester in response to the demands of their job. A student can defer for one semester and resume normal registration the following semester. However, if a student requires additional time off, he/she should request a leave of absence or the student will have to reapply to the Graduate School.

The core consists of five required courses. Students must take both Chem 5722, Advanced Biochemistry, and Biol 6615, Biotechnology Lab II. All students must take one of the Bioinformatics

courses, either Chem 5774, Bioinformatics, or Biol 5794, Applied Bioinformatics. A student must take one of the core molecular biology courses: Biol 6602, Advanced Molecular Biology; Biol 6608, Synthetic Biology; Biol 6632, Advanced Nucleic Acid Structure and Function; or Biol 6642, Advanced Plant Biology and Biotechnology. If additional courses within any of the categories are taken, one counts for the core and the remaining can count as electives.

The final core course is Biol 6889, Graduate Seminar. This course requires extensive reading and discussion of current literature. Having taken prior graduate courses is a significant advantage with respect to Biol 6889. Thus we recommend that students delay Biol 6889 until late in their program. Please note: only sections taught by a BCBT faculty member will count towards the degree.

Students are required to complete 15 credit hours of electives. A wide range of electives are offered. Within the courses approved as BCBT electives, there are no restrictions on the students' choice of electives. This flexibility allows students to tailor their degree to a particular emphasis area.

Other than our recommendation to delay graduate seminar, courses may be taken in any order or combination.

**Table 1. M.S. Degree in Biochemistry & Biotechnology, non-thesis option**

_____	Chem 4722 <i>Advanced Biochemistry</i> (3 credit hours)
_____	Chem 5774 <i>Bioinformatics</i> (3 credit hours) <b>or</b>
_____	Biol 5436 <i>Applied Bioinformatics</i> (3 credit hours)
_____	Biol 6615 <i>Advanced Biotechnology Laboratory II</i> (4 credit hours)
_____	Biol 6602 <i>Advanced Molecular Biology</i> (3 credit hours) <b>or</b>
_____	Biol 6608 <i>Advanced Synthetic Biology</i> (3 credit hours) <b>or</b>
_____	Biol 6632 <i>Advanced Nucleic Acid Structure and Function</i> (3 credit hours) <b>or</b>
_____	Biol 6642 <i>Advanced Plant Biology and Biotechnology</i> (3 credit hours)
_____	Biol 6889 <i>Graduate Seminar</i> (2 credit hours)

Electives (15 credit hours):

_____	Chem 4733 <i>Biochemistry Laboratory</i> (2 credit hours)
_____	Chem 5302 <i>Foundations of Physical Chemistry</i> (3 credit hours)
_____	Chem 5694 <i>Special Topics in Organic Chemistry</i> (when relevant; 1-3 credit hours)
_____	Chem 5772 <i>Advanced Physical Biochemistry</i> (3 credit hours)
_____	Chem 5774 <i>Bioinformatics</i> (3 credit hours)
_____	Chem 5794 <i>Special Topics in Biochemistry</i> (1-3 credit hours)
_____	Chem 6787 <i>Problem Seminar in Biochemistry</i> (1 credit hour)*
_____	Chem 6905 <i>Graduate Research</i> (1-5 credit hours)**
_____	Biol 122 <i>Biostatistics</i> (3 credit hours)
_____	Biol 4842 <i>Immunobiology</i> (3 credit hours)
_____	Biol 5012 <i>Advanced Genetics</i> (3 credit hours)
_____	Biol 5069 <i>Topics in Cellular and Molecular Biology</i> (1 credit hour)*
_____	Biol 5099 <i>Biology Colloquium</i> (1 credit hour)*
_____	Biol 5436 <i>Applied Bioinformatics</i> (3 credit hours)
_____	Biol 6442 <i>Advanced Developmental Biology</i> (3 credit hours)
_____	Biol 6550 <i>Advanced Bacterial Pathogenesis</i> (3 credit hours)
_____	Biol 6602 <i>Advanced Molecular Biology</i> (3 credit hours)
_____	Biol 6608 <i>Advanced Synthetic Biology</i> (3 credit hours)
_____	Biol 6622 <i>Advanced Cellular Basis of Disease</i> (3 credit hours)
_____	Biol 6632 <i>Advanced Nucleic Acid Structure and Function</i> (3 credit hours)
_____	Biol 6642 <i>Advanced Plant Biology and Biotechnology</i> (3 credit hours)
_____	Biol 6652 <i>Advanced Virology</i> (3 credit hours)
_____	Biol 6699 <i>Graduate Internship in Biotechnology</i> (1-4 credit hours)
_____	Biol 6889 <i>Graduate Seminar</i> (when relevant; 2 credit hours)
_____	Biol 6905 <i>Graduate Research</i> (1-5 credit hours)**
_____	Biol 6920 <i>Advanced Topics in Biology</i> (when relevant; 2-5 credit hours)

\* Maximum of 3 credit hours between BIOL 5069, BIOL 5099, and CHEM 6787.

\*\* Maximum of 5 credit hours total between Chem 6905 and Biol 6905 Graduate Research courses

### **Course Rotation.**

Classes in the MS curriculum rotate to maximize options for our students. Core (required) classes in the MS curriculum are taught once a year, in either the Fall or the Spring semester. Elective courses frequently rotate on a two year basis (fall of odd years, for instance). To help you plan your classes, the projected three year course plan can be found [online](#). Most classes are offered in the evenings to accommodate working students. Online options are available in many, but not all, semester.

### **Research Courses**

Non-thesis students are encouraged to gain research experience by registering for Chem 6905 or Biol 6905. Enrolling in these research courses allows students to receive academic credit for performing a research project in the lab of one of the BCBT faculty members. Non-thesis MS students can count up to 5 credit hours of research as elective hours in the MS program. Enrollment in a research course is by mutual agreement between the student and a faculty member. Students interested in this option should review the descriptions of faculty research area on the BCBT web page (<http://www.umsl.edu/~biotech/about/faculty.html>). The student should request a meeting with a potential Research Advisor and discuss such issues as the topic of a research project, space availability in the lab, lab hours expected per credit hour, the scheduling of lab hours, and the nature of the final research report. If there is a mutual agreement between the student and the faculty member, the student should contact the home department of the Research Advisor for a consent number that is required to enroll. Students are required to earn a minimum of 3.0 GPA in non-research courses to graduate; grades in research courses are not used in the program GPA calculation.

### **Selected/Special Topics Courses.**

The Biol 6920, Chem 5694, and Chem 5794 topics courses vary in content from one semester to the next. Students can repeat a special topics course as long as the topic is different. These course listings rotate through a variety of topics, only some of which are appropriate for BCBT students. In general, if one of these classes is being taught by a faculty member from the BCBT program, then the class can be used as an elective. To be sure that a specific offering will count as an elective for BCBT, please check with a Graduate Advisor before registering for the class.

### **Advising**

Students enroll themselves in classes using the [MyView system](#). It is the policy of the BCBT program to place an advising hold on every student for every semester. MyView will not allow you to register until this advising hold has been removed by a Graduate Advisor. There are two faculty Graduate Advisors for the MS program in BCBT.

Professor [Michael Nichols](#) (A-L)

Office: B319

Professor [Bethany Zolman](#) (M-Z)

Office: R424

You can contact your advisor for help with registration, according to the first letter of your last name as indicated in the parentheses above. If your class situation is simple and you are confident that you know what you need to take, it may be sufficient to simply email your course preferences to your advisor. If your advisor concurs, the hold will be lifted. Once the hold is lifted, you are expected to log into your account in MyView and register for your classes. Of course, your advisor is always happy to talk more about class options or the degree program in general; please make an appointment to allow time for these conversations.

Courses numbered at the 5000- and 6000-level are graduate courses. The courses at the 4000-level are taken both by graduate students and senior undergraduate students. When any student attempts to enroll in a 4000-level class, MyView checks for prerequisites and routinely fails to allow graduate students to enroll because it does not recognize your undergraduate coursework. We can bypass this block by providing you a consent number to register. Please email the instructor or your advisor for permission to enroll.

Additional information is provided to MS students every semester via the group [Canvas](#) page – be sure to check this out for information about courses, as well as graduation deadlines and job opportunities.

### **Graduate Internship**

Chem 6905 and Biol 6905 research is conducted on-campus. It is also possible to perform research off-campus and receive academic credit for Biol 6699, Graduate Internship in Biotechnology. In order to enroll in Bio 6699, you must be a student in good standing in the MS program and you must have a mentor/supervisor and a position in a research lab or in industry in the greater St. Louis region that is appropriate for a biotechnology internship. Please click [here](#) for details on the Internship and the required form to enroll in the Biotechnology internship.

### **Thesis MS Students**

All students are admitted to the MS program as non-thesis students. To transfer to the thesis program, a student must be accepted as a thesis student by one of the faculty members from BCBT, who agrees to serve as the Research Advisor. In most cases, a thesis student will be expected to enroll full-time (9 credit hours/semester). The student and advisor will work together to form a Thesis Committee, which will be officially appointed by the Graduate Dean using [Form M-2](#). The core course requirements are

the same for thesis and non-thesis students. Thesis MS students may count up to 12 credit hours of Chem 6905 or Biol 6905 as elective hours in their degree program. Thesis students must write and defend an original Thesis describing their individual research project. The Thesis must be approved by the Thesis Committee using [Form M-3](#).

### **Graduation Requirements.**

All MS students must submit a degree program application to the Graduate School that documents that all the core courses and the 15 credit hours of elective courses have been completed with a gpa of 3.0 (calculated using all non-research courses).

The program gpa is calculated based only on the 30 credit hours of courses presented to the Graduate School to satisfy the degree requirements. If you receive a poor grade in an elective course, you can in effect remove that grade from your program gpa by taking an additional elective course and using the second course for your degree program. If you receive a poor grade in a core course, you can retake the course, and your program gpa will be calculated based on the grade you receive in the retake. All grade replacements must be approved prior to taking the second course using [Form C5](#).

Please note, in the final semester, all students must apply for their MS degree by submitting [Form M-4](#) to the Graduate School. These forms are typically due in week 4 of the semester, so [check the dates](#) to ensure timely submission.

## **Probation**

The Graduate School requires a minimum overall gpa of 3.0 for a student to remain in good standing. If the cumulative gpa falls below 3.0, the student will be placed on academic probation by the Graduate School. In most cases, a student who has been placed on probation will be allowed at least one additional semester to show improvement. However, in the case of exceptionally poor grades, a student may be dismissed.

When a student is placed on probation, the BCBT program will evaluate the overall academic record and will communicate to the student the expectations for improvement during the following semester. In general, it is not necessary that a student bring the overall gpa up to 3.0 in one semester. Instead, the BCBT program expects significant improvement, so that we can see a realistic path to getting back to a 3.0 gpa. The key issue is whether a student is making significant progress toward the degree. A second consecutive semester of poor grades may result in dismissal from the program. In addition, dropping all or most classes is not significant progress. Consistent failure to complete courses may also result in dismissal from the program.

**Congratulations on starting the BCBT MS program – we are excited to have you in our program and hope that the answers to many questions are contained here. If you have additional questions, please feel free to email [bcbtinfo@umsl.edu](mailto:bcbtinfo@umsl.edu) or contact your graduate advisor.**