M.S. IN BIOLOGY WITH A CONCENTRATION IN BIOTECHNOLOGY

Application/Acceptance: Students must submit a written letter of application to be considered for admission into the Biotech concentration. This application letter should include three areas of practical training that the student envisions and potential faculty sponsors. Students not currently enrolled in the M.S. program should include the application letter in the personal statement of their M. S. online application form; successful applicants will be admitted into both the M.S. program and the biotechnology concentration. Students who are currently enrolled in the M. S. program should submit the application letter to the graduate coordinator. In addition to the M.S. program admission requirements, applicants to the Biotechnology concentration must have completed Chem 6600 (Biochemistry) or its equivalent with a grade of “B” or better. Admission to the concentration will be made by the Biotechnology Area Committee on the basis of credentials and is dependent on space availability.

Discipline Specific Requirements:

- Biol 6696 Laboratory Techniques in Molecular Genetics (4)
- Biol 8970 Instrumentation (1)
- Biol 6694 Biosafety: Principle & Practice
- Biol 6438 Applied Microbiology
- Biol 6484 Lab Tech: Applied and Environmental Microbiology
- Biol 6595 Microbial Physiology and Genetics
- Biol 6640 Fundamentals of Bioinformatics
- Biol 6680 Biological Imaging
- Biol 6595 Lab in Electron Microscopy
- Biol 6640 Biostatistics
- Biol 6680 Advanced Methodologies in Biostatistics
- Biol 6690 Concepts in Biotechnology
- Biol 6690 Fermentation
- Biol 6744 Protein Purification
- Biol 6744 (Potential topics include):
  - Biol 8540 Expression in yeast
  - Biol 8540 Eukaryotic Expression
  - Biol 8540 Biosafety
  - Biol 8540 Radiochemical Safety
  - Biol 8540 Quality Control
  - Biol 8540 Intellectual Property
  - Biol 8540 Robotics
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>Biol 8970</td>
<td>Topics in Molecular Biology</td>
</tr>
<tr>
<td>Chem 6000</td>
<td>Fundamentals of Chemical Analysis</td>
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<tr>
<td>Chem 6150</td>
<td>Introduction to Biophysical Chemistry</td>
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<tr>
<td>Chem 6190</td>
<td>Introductory Methods III: Spectroscopy</td>
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<tr>
<td>Chem 6820</td>
<td>Analytical Laboratory</td>
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<tr>
<td>Chem 6850</td>
<td>Bioanalytical Chemistry I</td>
</tr>
<tr>
<td>Chem 6860</td>
<td>Bioanalytical Chemistry II</td>
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<td>Chem 6871</td>
<td>Electrochemical Methods</td>
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**Non-Thesis Option**

**Core Courses (5CH):**

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<tbody>
<tr>
<td>Biol 6696</td>
<td>Laboratory Techniques in Molecular Genetics (4)</td>
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<tr>
<td>Biol 8970</td>
<td>Instrumentation (1)</td>
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**Laboratory Practica (15CH):**

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<th>Course Code</th>
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<tr>
<td>Biol 6440</td>
<td>Practicum in Biotechnology (15)</td>
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(Minimester; 5 hours each time taken)

**Non-Thesis Research Paper Preparation (4CH):**

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<th>Course Code</th>
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<tr>
<td>Biol 8888</td>
<td>Non-Thesis paper writing (4)</td>
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**Seminar**

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<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>Biol 8700</td>
<td>Seminar (2)</td>
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**Electives (14CH) (Approved by Biotechnology Committee)**

**TOTAL 40 hours**

**Laboratory Practica:** A series of intensive courses designed to provide a student with working “hands-on” knowledge and experience in selected areas of current interest/importance in biotechnology. Hands-on experience will be integrated with theory and current best-practices. To maximize the learning experience and to maintain a reasonable instructor to student ratio, the enrollment in each practicum will be limited (5 students maximum).

**Tentative Subject topics for the Practica include:**

- Fermentation Processes
- Differential In-Gel Protein Analysis
- Biological Imaging
- Electron Microscopy
Upon completion of each rotation, the student will submit a progress report covering activities engaged in during the rotation. An advisor will mentor the student in the writing process. The three progress reports will constitute part of the Non-Thesis research paper and will comprise the basis of a portfolio that the student can use as evidence of training and accomplishments.

**Thesis Option**

For admission into the Thesis option, the student must have a Thesis proposal accepted.

**Prerequisite (5CH):**

Chem 6600 Biochemistry (5)

**Core Courses (5CH):**

Biol 6696 Laboratory Techniques in Molecular Genetics (4)
Biol 8970 Instrumentation (1)

**Laboratory Practica (15CH):**

Biol 6440 Practicum in Biotechnology (Minimester; 5 CH each time taken)

**Thesis Research (14CH):**

Biol 8999 Thesis Research (14 CH)
Up to 10CH of Biol 6440 (Practica) can be applied towards the Thesis Research requirement. 14 credits must come from 8999.

**Seminar (2 CH):**

Biol 8700 Seminar (2 semesters)

**Electives (4 or 9 CH) (Approved by Biotechnology Committee) **

TOTAL 40 hours

Laboratory Practica: Both technique-based and project-based rotations will be offered. Students will meet with an advisory upon entrance into the concentration to determine rotations that best suit the student’s goals and needs.

Research Paper: The student will submit a Thesis proposal to be accepted by a Thesis Committee. The student will complete a Thesis to be defended before the Thesis Committee. The Thesis may be based upon research done during the rotations.

Examination: The MS examination will consist of an oral defense of the Thesis Proposal.