Biotechnology

Degree Offered: M.S.
Program Director: Tino Unlap, PhD
Phone: (205) 934-7382
E-mail: unlap@uab.edu
Website: http://www.uab.edu/shp/cds/biotech

Program Information

Program Mission

The faculty members of the Biotechnology Program are devoted to providing excellent service to the community and its graduates. The faculty, in its concern for the health and safety of the general public, is committed to ensuring that each student develops knowledge, skills, and values essential to the appropriate role providing the basis for continuing intellectual and professional growth. Out of a great concern for applied technology and the role that it plays in the diagnosis, management and treatment of human disease, and in developing products to solve problems for present and future generations, the Program is designed to provide instruction through didactic and practical training in order to ensure that its graduates possess the critical knowledge and skill sets that are required for intellectual and professional growth in the future. An online option is available to give individuals with BS degrees already working in the Life Science industry the opportunity to earn a relevant MS degree.

Biotechnology Careers

The goal of the Master's degree program is to provide a more direct route to a career in biotechnology by focusing on mastering current techniques used in biotechnology coupled with the business fundamentals necessary for successful product/technology development in the industry. The multi-disciplinary aspects of this program will broaden and expand the knowledge base of students, thus making graduates particularly useful to potential industry employers. According to the U.S. Department of Labor Occupational Outlook Handbook, 2010, the demand in the biotechnology field continues to drive job growth, with much higher expected increases in career opportunities to be realized as compared to all other industries for the next several years (Batelle, 2012). The Biotechnology Program is a Master of Science degree that requires 3 semesters for completion as full-time students. The Master of Science requires 37 credit hours and is designed for individuals who hold a Bachelor of Science or Bachelor of Arts degree in a related discipline including biology, chemistry, biochemistry, physics, engineering, mathematics, psychology and sociology.

M.S. Admission Requirements

In addition to the general Graduate School admission requirements, applicants to the M.S. program must:

- Have a biology, chemistry, or a related major from an accredited college or university,
- Have a minimum undergraduate GPA of 3.0 (A = 4.0), computed from all undergraduate credits or from the last 60 semester hours of undergraduate course credit,
- Provide a written statement of career goals,
- Complete an interview with the program admissions committee, and
- If foreign-educated, have a score of at least 550 for paper version (or 80 for Internet version; or 213 for computer version) on the TOEFL, submit a transcript evaluation from World Education Services (WES) at www.wes.org. (http://www.wes.org)

If accepted, students must complete the UAB medical history questionnaire and physical, provide proof of required immunizations, and receive satisfactory screening by the UAB Medical Center Student Health Service before enrollment. Accepted students must complete a background check and drug screen at admission and prior to placement in clinical internships by school policy.

Essential Requirements

Fundamental tasks, behaviors, and abilities necessary to successfully complete the requirements of the Program are available upon request from the Biotechnology program office. If you have a disability, but have not contacted Disability Support Services (DSS), please call 934-4205 or visit http://www.uab.edu/students/disability/. (http://www.uab.edu/students/disability/)

Additional Information

<table>
<thead>
<tr>
<th>Entry Term</th>
<th>Fall semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deadline for All Application</td>
<td>February 28 (Early Acceptance), August 1 (Final Acceptance)</td>
</tr>
<tr>
<td>Materials to be in the Graduate School Office</td>
<td>None</td>
</tr>
<tr>
<td>Number of Evaluation Forms Required</td>
<td>None</td>
</tr>
<tr>
<td>Entrance Tests:</td>
<td>For international applicants from non-English speaking countries, scores for the Test of English as a Foreign Language (TOEFL) and the Test of Written English (TWE)</td>
</tr>
<tr>
<td>Comments:</td>
<td>Financial aid (fellowship, stipend or assistantship) is not available from the program; scholarship availability is limited; transcript evaluation by WES is required for applicants with foreign university degrees</td>
</tr>
</tbody>
</table>

Contact Information

For detailed information, contact the Department of Clinical and Diagnostic Sciences, Biotechnology Program, UAB School of Health Professions, SHPB 430, 1716 9th Avenue South, Birmingham, Alabama 35294-1212. Telephone 205-934-3209. E-mail AskCDS@uab.edu

Master of Science in Biotechnology

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT 500</td>
<td>Principles of Biotechnology - Nucleic Acid Technology</td>
</tr>
<tr>
<td>BT 550</td>
<td>Principles of Biotechnology - Amino Acid Technology</td>
</tr>
<tr>
<td>BT 600</td>
<td>Principles of Biotechnology - Systems Biology &amp; Pharmacology</td>
</tr>
<tr>
<td>BT 650</td>
<td>Applications in Biotechnology I</td>
</tr>
<tr>
<td>BT 651</td>
<td>Applications in Biotechnology II</td>
</tr>
<tr>
<td>BT 652</td>
<td>Applications in Biotechnology III</td>
</tr>
<tr>
<td>BT 670</td>
<td>Bench to Commercialization I</td>
</tr>
</tbody>
</table>
BT 671. Bench to Commercialization II 3
BT 672. Bench to Commercialization III 3
BT 690. Capstone: Integrating Basic Science and Product Development 4
BT 695. Biotechnology Internship 2
CDS 505. Professional Skills Development 1
CDS 610. Research Design and Statistics 3
Innovative Technologies in Biotechnology (take three times) 3
BT 676. Innovative Technologies in Biotechnology

Total Hours 37

Master of Science in Biotechnology (Online)

Requirements Hours
BT 500. Principles of Biotechnology - Nucleic Acid Technology 3
BT 550. Principles of Biotechnology - Amino Acid Technology 3
BT 600. Principles of Biotechnology - Systems Biology & Pharmacology 3
BT 605. Applications of Biochemistry in Biotechnology 3
BT 670. Bench to Commercialization I 3
BT 671. Bench to Commercialization II 3
BT 672. Bench to Commercialization III 3
BT 675. Special Topics in Biotechnology 3
Innovative Technologies in Biotechnology (1 credit; take three times) 3
BT 676. Innovative Technologies in Biotechnology
BT 695. Biotechnology Internship 2
BT 698. Non-Thesis Research 4
CDS 505. Professional Skills Development 1
CDS 610. Research Design and Statistics 3

Total Hours 37

Courses

BT 500. Principles of Biotechnology - Nucleic Acid Technology. 3 Hours.
Theories and knowledge required for the development and commercialization of nucleic acid-based technology for the biotechnology industry including genes, cloning, detection, therapies, diagnostics, and analysis.

BT 550. Principles of Biotechnology - Amino Acid Technology. 3 Hours.
Theories and knowledge required for the development and commercialization of amino acid-based technology for the biotechnology industry including protein-based therapeutics, diagnostics, vaccines, and research reagents.

BT 600. Principles of Biotechnology - Systems Biology & Pharmacology. 3 Hours.
Theories and knowledge required for the understanding of the science and technology of systems biology and pharmacology.

BT 605. Applications of Biochemistry in Biotechnology. 4 Hours.
Current concepts of human biochemistry and molecular biology; protein structure and function, enzymes, intermediary metabolism, biosynthesis of lipids, and utilization of lipids; special emphasis on the molecular basis of inherited genetic diseases, acquired diseases, and clinically-related biochemistry in Biotechnology.

BT 650. Applications in Biotechnology I. 2 Hours.
Lab provides the opportunity to set-up, perform, and interpret the results of various molecular assays. These include, but are not limited to, the following: nucleic acid isolation, enzymatic manipulation of nucleic acids, gel electrophoresis, amplifications reactions and hybridization reactions. Most of the laboratory work will involve a eukaryotic system.

BT 651. Applications in Biotechnology II. 2 Hours.
A laboratory that prepares students for the biotechnology industry by teaching how recombinant DNA can be used to generate specific proteins in any protein expression system.

BT 652. Applications in Biotechnology III. 2 Hours.
Laboratory applications required for the research and development of nucleic acid and amino acid based technology for the biotechnology industry.

BT 670. Bench to Commercialization I. 3 Hours.
Focus on growth of a biotechnology company from inception through the early stages of development. Topics will include market assessment, business plan development, raising capital, and regulatory and quality systems requirements for drugs, biologics, medical devices or combination products.

BT 671. Bench to Commercialization II. 3 Hours.
Focus is on the issues and challenges affecting the life cycle of a biotechnology company and product as it progresses through the different stages of development including regulatory strategies, financing strategies, business development, and marketing strategies.

BT 672. Bench to Commercialization III. 3 Hours.
Focus is on the role of managers and leaders within biotechnology companies as they undergo constant change. The course will review effective communication strategies, problem solving tactics, leadership skills and development of methods to implement change. Students will focus on developing writing, verbal, and presentation skills through a series of projects.

BT 675. Special Topics in Biotechnology. 1-4 Hour.
Exploration of current issues in Biotechnology.

BT 676. Innovative Technologies in Biotechnology. 1 Hour.
An overview of new and innovative technologies used in the discovery, development, and production of biotechnology products. This will include a series of guest speakers who have successfully discovered novel technologies and products and transitioned them into early-stage companies.

BT 690. Capstone: Integrating Basic Science and Product Development. 1-4 Hour.
Synthesis of biotechnology knowledge used to develop innovative products for the life science industry. Application of product phases including the discovery, preclinical, clinical, FDA review and post-marketing surveillance. Working on teams, to select products/medical devices and critically evaluate how these products were developed and identify strengths and weaknesses in each phase of development.

BT 695. Biotechnology Internship. 2-4 Hours.
Supervised basic research in areas including molecular biology, protein chemistry, drug discovery, cardiovascular diseases, neurodegenerative diseases and cancer. Students are trained in research planning and execution, problem-solving, team work, and data analysis and presentation.

BT 698. Non-Thesis Research. 1-6 Hour.
Non Thesis Research.