BT-Biotechnology

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. 3 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 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. 1-4 Hour.
Non Thesis Research.

BT 701. Cellular and Molecular Biotechnology I. 3 Hours.
Study of prokaryotic systems focusing on structures, functions and replicative processes with particular emphasis on the systems that are used in the Biotechnology Industry, especially bacteria. The students will learn the central dogma in prokaryotes from DNA replication to transcription and translation and the sorting of proteins to various destinations using different transport systems. Bacterial enzymes, including restrictions endonucleases, will be examined and the use of these enzymes to develop innovative products for the life science industry.

BT 702. Cellular and Molecular Biotechnology II. 3 Hours.
Study of the principles of cellular and molecular biology using innovative life science technologies to demonstrate the biological mechanisms that were used to develop these products. General topics will include DNA replication, DNA repair, DNA Transcription, Posttranscriptional Modifications, Translation, and Posttranslational Modifications. Existing technologies will be discussed under the appropriate topic in order to enable the students to see how a particular biological process leads to the development of a number of innovative technologies.

BT 725. Creating a Biotechnology Venture. 3 Hours.
An in-depth look at starting a new biotechnology company. Specifically, the course will provide a roadmap for starting a company with an overview of the challenges and opportunities that biotechnology start-ups face.

BT 730. Managing and Leadership in Biotechnology. 3 Hours.
Leadership skills, communication, conflict resolution and organizational structures specific to biotechnology companies.

BT 732. Financing a Biotechnology Venture. 3 Hours.
Provide students with limited knowledge in finance the ability to understand the financial basics unique to running a biotechnology company from inception through commercialization.

BT 740. Biotechnology Seminar/Journal Club. 1 Hour.
Assigned readings, student presentations, and discussion of current literature and development activity in the life sciences and biotechnology industries.

BT 745. Research Design and Statistics for Biotechnology. 3 Hours.
Issues of contemporary research design and methods in biotechnology; focus on translational research and areas of controversy; application of statistical software with emphasis on interpretation of findings for decision support.

BT 750. Laboratory Rotation I. 1 Hour.
First in series of three laboratory rotations completed during the first two years of graduate study. Each laboratory rotation is 8-12 weeks in duration, and will be designed to allow the student to explore a potential avenue of research for their dissertation and project deliverable.

BT 751. Laboratory Rotation II. 1 Hour.
Second in series of three laboratory rotations completed during the first two years of graduate study. Each laboratory rotation is 8-12 weeks in duration, and will be designed to allow the student to explore a potential avenue of research for their dissertation and project deliverable.

BT 752. Laboratory Rotation III. 1 Hour.
Third in series of three laboratory rotations completed during the first two years of graduate study. Each laboratory rotation is 8-12 weeks in duration, and will be designed to allow the student to explore a potential avenue of research for their dissertation and project deliverable.

BT 753. Advanced Applications in Biotechnology. 3 Hours.
Basic molecular techniques used in research from bacterial culture to gene regulation. Techniques will be taught under the umbrella of a research project which will involve the cloning of a mammalian gene into an expression vector, its purification, sequencing, transfection into a mammalian cell host and the detection of the protein product. The techniques used will include PCR, cloning, transformation, plasmid isolation, DNA sequencing, transfection and protein detection using immunofluorescence and Western blot techniques.

BT 770. Drug Discovery. 3 Hours.
Overview of pharmaceutical development from target identification through pre-clinical development; focus on small molecule and biological products.

BT 772. Medicinal Chemistry. 3 Hours.
Comprehensive overview of concepts related to actions and clinical uses of major classes of drugs from their chemical structures; focus on structure-activity relationships, pharmacokinetics, and pharmacodynamics.

BT 795. Special Topics in Biotechnology. 1-4 Hour.
Special topics in Biotechnology.

BT 797. Independent Study. 1-3 Hour.
Student exploration of topic specific to their research agenda.

BT 798. Nondissertation Research. 1-9 Hour.
Independent student research to prepare dissertation proposal. Mentored by appointed Graduate Study Committee. Continuous registration is required until student is admitted to candidacy.

BT 799. Dissertation Research. 1-12 Hour.
Independent student research to complete dissertation project and written report. Mentored by appointed Graduate Study Committee.