Biotechnology Program Specific Courses

Topics in Advanced Biotechnology I: Students and faculty meet bi-weekly during the fall semester for the Topics course. This forum introduces the new students to research opportunities within the program and allows senior students to sharpen their presentation skills by providing an experienced audience to critique their work. Students, who do not have ongoing work to describe, present a recent paper from the literature which is chosen in consultation with the faculty/student group.

Topics in Advanced Biotechnology II: This course is one of the unifying threads of the Program. It occurs biweekly during each spring semester (for 3 hour sessions), and all students in the training program (those currently supported as well as those who were supported in the past) are required to attend. The course serves as a forum to: 1) highlight and unify ongoing biotechnology research on campus, 2) introduce emerging new areas of biotechnology to students and faculty, and 3) provide trainees with insight into the technological development of basic discoveries. Faculty guide students in the choice of literature articles that they will present. Critical analysis of data, its interpretation and implications are highlighted, and special attention is paid to applied research, technology-oriented issues, ethical considerations, and policy-oriented issues in the subject area. In this regard, invited investigators from industry play a key role.

Bioengineering in the Biotechnology and Pharmaceutical Industries: The goal of this course is to offer students insight into the practical aspects of industrial bioprocessing. Industrial practitioners from various fields of expertise provide lectures and facilitate discussions highlighting problems and issues that engineers and scientists encounter. Topics vary from year to year but always include: drug discovery, drug metabolism, microbial fermentation and mammalian cell culture optimization and scale-up, monoclonal antibody, vaccine and gene therapy production, downstream purification, drug delivery, formulation, regenerative medicine, stem cell culture, tissue engineering, cellular therapies, regulatory considerations, manufacturing challenges, and clinical research. This course provides students with exposure to topics which are beyond the scope of a purely theoretically-structured course. After taking this course, students have a much better understanding of the challenges that engineers and scientists face in industrial bioprocessing.

Innovation and Entrepreneurship for Science and Technology: This course introduces and outlines the fundamentals of “technology entrepreneurship” and introduces a framework for identification of high-potential, technology-intensive, commercial opportunities, gathering required resources (human and financial), and maturing the innovation to a commercializable product. The course places a specific focus on commercialization derived from scientific and technological research with special emphasis on biotechnology and the life science industry. The course is led by Susan Engelhardt with guest lecturers from industry and academia. The course objective is to have students complete the class with: 1) an understanding of the major components of the life cycle from research to innovation to commercialization, 2) knowledge of the many ways that innovation manifests itself, in the context of start-up, corporate, social and public sector concerns, 3) practical methods to intelligently and objectively evaluate potential commercialization opportunities, and 4) a framework within which to consider the ethical issues that are intertwined with entrepreneurial activities. Through the collection of lectures and projects, students build upon the following critical skills for entrepreneurial success: 1) opportunity evaluation, 2) strategic thinking, 3) teamwork, 4) art of selling, persuasion and motivation, oral and written communication, basics of start-up legal concepts, basics of start up finance and accounting. This course was developed in response to student demand.