Yeshiva University
KATZ SCHOOL

MS in Biotechnology Management & Entrepreneurship Course Descriptions

Foundations of Biotechnology
Provides a top-level understanding of the interdisciplinary scientific foundations of biotechnology. Topics include the molecular foundations of biotechnology, molecular microbiology, receptor pharmacology, drug development processes, biotech process development and scale-up, drug approval and regulatory affairs, genomics, microarray analysis, proteomics, computational biology, molecular modeling, analytical biotechnology, bioterrorism, and biotechnology.

Biotechnology Management
Provides an overview of the activities and knowledge required to lead and administer biotechnology and pharmaceutical companies. Topics include health technology assessment and cost-effectiveness analysis; personalized medicine, pharmacogenomics, and companion diagnostics; drug pricing and reimbursement; governmental payers; patents and intellectual property; and information in health care.

Pharmacology Product Development and Commercialization
Provide students with a working knowledge of the policies, processes, and procedures for drug-discovery, development, and commercialization. Topics cover drug development from bench to bedside, including portfolio and pipeline management; and health economics research.

Applications of Biotechnology
Provides an overview of the many different applications of biotechnology in medicine and the fundamental science underlying these products and techniques. Topics include: DNA sequencing; immunology; microscopy; culture and differential staining; and pharmacogenetics, among others.

Intellectual Property, Regulation and Compliance for Biotechnology
Provides an introduction to the legal system, including contract and intellectual property law; an understanding of the key regulatory agencies and areas of compliance impacting biotechnology activities; and a strong foundation in the ethical issues concerning the development and commercialization of biotechnology products. Topics include: criminal and civil liability; laws that govern the use, testing, development and licensing of biotechnology; regulatory agencies; quality assurance; and ethics of research, among others.

Capstone in Biotechnology Management and Entrepreneurship
In this course, students will integrate the skills developed in previous classes into a comprehensive body of knowledge, and they will provide tangible evidence of competencies in Biotechnology Management and Entrepreneurship. The capstone will

include four components: 1) a brief proposal and project schedule; 2) the main project deliverable; 3) a final presentation; and 4) a reflection on the student's knowledge of biotechnology operations, commercialization and product development.

Survey of Life Sciences
This course is a survey of biochemistry, cellular and molecular biology. Topics include: the structure of cells; proteins, carbohydrates, lipids, and nucleic acids; DNA, genetics and gene expression; cell growth and cancer; metabolism-energy generation and their implications for disease and drugs.

Applied Biologics
This course is composed of multiple modules, each focused on a particular technology such as DNA sequencing, proteomics, metabolomics, imaging, synthetic biology, immunology, gene editing etc).

Biostatistics and Informatics
Provides students with the fundamental principles of experimental design, statistical and exploratory data analysis and visualization, emphasizing research related to human health and clinical settings. Statistical topics include descriptive statistics, hypothesis testing, analysis of variance, correlation, regression, chi-square test, and nonparametric methods. Study design topics include population selection, inclusion/exclusion criteria, strengths and limitations of respective study designs, and interpretation of study results.

Clinical Trials and Research Management
Provides an interdisciplinary, state-of-the-art scientific introduction of clinical trials and research management to biotechnology to students. Topics include: designing and managing clinical trials, trials documentation, pediatric trials, risk management, IRB and FDA guidelines for clinical trials, NIH and NSF grants management, clinical trials data management and protocols.

Technology Entrepreneurship
Provides an introduction to the critical factors of success for entrepreneurial ventures and examines intrapreneurship within existing companies. Topics include: innovation models, diffusion of innovations; growth-share matrix, identifying high value opportunities; developing a business plan; determining pricing and implementing an integrated marketing strategy; entrepreneurial leadership, innovation ecosystems and networks of innovation; hiring talent and managing incentives; financial management and acquisition of capital.

Finance for Startups and Entrepreneurial Ventures
Provides students with a foundation for making financial decisions in startups and entrepreneurial ventures. Topics include: basic accounting principles; financial statement analysis (income statements, balance sheets, and statement of cash flows); strategic planning, capital budgeting and forecasting; expectations of investors, methods of valuation,

dilutive and non-dilutive sources of funding; developing investor pitches, negotiating term sheets; and evaluating exit strategies.

Internship in Biotechnology Management and Entrepreneurship
This course consists of an off-campus internship experience supervised by a staff person at the internship site and overseen by a faculty advisor. The internship site must be approved by the program director, and the overall duration of student work must be no less than 150 hours (based on a 3-credit course). At the start of the internship, the student and faculty advisor will jointly develop specific learning objectives tailored to the nature of the internship. Over the course of the internship, students will be required to submit weekly reflections, and at the end of the internship, students write a final paper that represents the culmination of the work performed.

Special Topics in Biotechnology Management and Entrepreneurship
This course provides the opportunity to offer boutique short-term courses on emerging phenomena, policies, processes, technologies, and techniques in biotechnology management and entrepreneurship. The expectation is that this will be an advanced class that requires an appropriate student project and deliverable in line with the number of credits awarded for the course.

Independent Study in Biotechnology Management and Entrepreneurship
This independent study course provides the student with the flexibility to learn more about a topic of interest outside of the formal course setting. The subject should be chosen in consultation with a faculty advisor who acts as the student's supervisor, and with the permission of the program director. The student is required to submit a course contract describing the course of study and its specific learning objectives. Course credit is determined in advance of the course, by the instructor with the approval of the program director.