Proposal for MS in Cell and Gene Therapies

Program description

Northeastern's Master of Science in Cell and Gene Therapies is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in advanced therapies such as cell therapies and gene therapies with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of the cell and gene therapies fields.

Program contributions to the university's mission

The proposed program will support the growing needed for specifically trained individuals in cell and gene therapies within the Biotechnology space. The program is designed to be a professional science program giving students not only technical training but training in professional skills and contains a mandatory co-op.

Curriculum

Total Credits: The MS in Cell and Gene Therapies totals 32 semester hours (29 SH of core courses and 3 SH of electives). No concentration is specified for the start.

Core Courses (29 semester hours):

Course	Name	Hrs
BIOT 5800	Gene Therapies	2
BIOT 5820	Cellular Therapies	2
BIOL 5543	Stem Cells and Regeneration	4
BIOL 5583	Immunology	4
BINF 6200	Bioinformatics Programming	4
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOL 6381	Ethics in Biological Research	2
PMST 6254	Advanced Drug Delivery Systems	3
BIOT 5830	Regulatory Landscape of Cell and Gene Therapies	2
BIOT 5840	Cell and Gene Therapies lab	3
BIOT 6500	Professional Development for Co-op	0

*Co-op**. During the course of their graduate studies, students must complete one (mandatory) graduate co-op. We estimate that the program will take 2-2.5 years to complete. This includes 1 co-op. Courses and co-ops are shown in the pattern of attendance.

College of Science Co-op Policy*

The College of Science regards Co-op as an integral part of the graduate experience for students. We will uphold the existing Office of Global Service Policy that states students must have completed at least one

academic year (two full-time semesters) in order to be eligible for CPT. For programs in which Co-op is required (MS in Biotechnology), the College will allow international students to engage in Co-op anytime in their academic career after two full-time semesters, as long as it is within the duration of their program as specified on the I-20 Certificate of Eligibility. For programs that do not require Co-op (MS in Applied Mathematics, MS in Operation Research, and MS in Bioinformatics – effective Fall 2018), students are not eligible for Co-op during their last semester. Special exceptions will be considered if students need to extend the duration of their I-20 Certificate of Eligibility to participate in Co-op.

Elective Courses: Students are required to complete 3 semester hour elective. Choose one course from the list below.

Course	Name	Hrs
CHME 5101	Fundamentals of Chemical Engineering Analysis	4
CHME 5160	Drug Delivery: Engineering Analysis	4
CHME 5185	Design of Experiments and Ethical Research (DOEER)	4
CHME 5630	Biochemical Engineering	4
CHME 5631	Biomaterials Principles and Applications	4
CHME 5632	Advanced Topics in Biomaterials	4
BINF 6308	Bioinformatics Computational Methods 1	4
BIOE 5430	Principles and Applications of Tissue Engineering	4
BIOE 6000	Principles of Bioengineering	1
BIOL 5307	Biological Electron Microscopy	4
BIOL 5543	Stem Cells and Regeneration	4
BIOL 5549	Inventions in Microbial Biotechnology	4
BIOL 5569	Advanced Microbiology	4
BIOL 5573	Medical Microbiology	4
BIOL 5581	Biological Imaging	4
BIOL 5583	Immunology	4
BIOL 5587	Comparative Neurobiology	4
BIOL 5591	Advanced Genomics	4
BIOL 6381	Ethics in Biological Research	2
BIOL 6399	Course BIOL 6399 Not Found	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5226	Biotechnology Entrepreneurship	3
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	3
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5340	Introduction to Biotherapeutic Approvals	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5500	Concepts in Regulatory Science	3
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3

BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6310	CGMP Statutes and Regulation	3
BIOT 6320	Quality Management Systems and Validation	3
BIOT 6330	Plant Design and Facilities	3
BIOT 6340	Sterile Manufacturing Operations	3

Admission Requirements

No change.

Credit hour requirements

The MS in Cell and Gene Therapies totals 32 semester hours, including 29 core semester hours and 3 elective semester hours.

Application Procedures

No change.

Estimated enrollment:

- **Year 1** 20
- **Year 2** 50
- **Year 3** 100
- **Year 4** 150

The cell and gene therapies fields are fast growing. Their market potentials are similar as MS BIOT's.

Program market analysis

See attachments re: 1) Market Analysis: Master's in Advanced Regenerative Medicine 2) Market Analysis: Master's in Animal Models and Stem Cell Research