Degree Proposal
Master of Science in Cell and Gene Therapies
College of Sciences

Executive Summary

Cell and gene therapies (CGT) represent the future of medicine. After years of promise, the field is beginning to realize its potential, as evidenced by the growth in the biotech sector and the large number of clinical trials currently on-going for cell and tissue engineered therapies in the US. CGT promise life-changing treatments and its products account for some 12 percent of the pharmaceutical industry's clinical pipeline and at least 16 percent of its preclinical pipeline as of 2021. Given the strong growth indicators, COS proposes a new Master of Science degree in Cell and Gene Therapies. This degree program seeks to prepare students for the evolving field of cell and gene therapy medicines with an emphasis on technical skills, the regulatory landscape of this new class of biologic, and business and interpersonal skills.

The Master of Science in Cell and Gene Therapy 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 therapy fields. In particular, this degree program draws upon existing courses in COS to provide students with: (1) the most cutting-edge topics available in molecular biology today, such as stem cells, RNA interference, CRISPR/CAS9, CAR T-cells, and gene therapy; (2) the fundamental programming skills (R and Python) required in the bioinformatics industry; (3) a broad understanding of biotechnology entrepreneurship, management, and the legal aspects of science, technology, and research in the biotechnology context; and (4) an integrated experiential learning opportunity through co-op.

The program prepares students to enter the labor force with a well-rounded and marketable skillset for either doctoral studies or career entry.

The Master of Science degree program in Cell and Gene Therapies will have a variety of concentrations and the opportunity for experiential learning. The total degree program will require 32 semester hours. The program will consist of: (1) 29 semester hours of core courses; and (2) a required 3 semester hours of elective courses. There is no concentrations at the start of the program.

The College of Sciences charged its Committee on Graduate Curriculum (GCC) to evaluate the potential for a new master's degree program in the field. The GCC convened through 2022 to discuss the potential of a new degree program. In collaboration with market research in Enrollment Management, the GCC collected data to assess market environment and developed a curriculum. On February 15, 2022, the GCC unanimously recommended the Master of Science in Cell and Gene Therapies. On February 23, 2022, the Graduate Council

unanimously approved the degree program. The Associate Dean of Professional Programs and Graduate Affairs and the Dean of the College enthusiastically support the new degree program.

Program Description

Master of Science in Cell and Gene Therapies is a professional master's program, an innovative, nonthesis graduate degree. It 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. This program will prepare students for the evolving field of cell and gene therapy medicines with an emphasis on technical skills, the regulatory landscape of this new class of biologic, and business and interpersonal skills.

The master's degree program will prepare students with a foundational education in stem cell biology and regenerative medicine and knowledge in how innovative approaches are brought to the biomedical community. Students in this degree program will have the opportunity to gain advanced training in statistical analysis, research methodology, and biotechnology business framework aligned to key areas of strength in COS, including: Stem Cells and Regeneration; Bioinformatics Programming; Cell Culture Processes for Biopharmaceutical Production; Advanced Drug Delivery Systems; Cellular Therapies; Gene Therapies; and Biotechnology Enterprise. There areas provide a distinctive competitive advantage for Northeastern University.

The program will take advantage of various co-op opportunities—positions such as medical scientists, medical laboratory technologiests, bioinformatics scientists, geneticists—that provide students a professional environment to integrate quantitative skills and data analysis. The learning opportunities in professional settings reinforce the development of advanced quantitative skills. Ultimately, the Master of Science in Cell and Gene Therapies will position students to enter the labor force with the competitive advantage of these experiences and skills.

Program Contribution 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. The proposed degree program is intended to expand our strengths in rigorous methodological and analytical training with theoretical grounding in sciences by providing a pathway for educating students for careers that demand a skillset that integrates data science and business frameworks for answering pressing analytical and regulartory questions. The program seeks to build on COS's commitment to our mission – "provide an innovative, experientially-driven scientific education that inspires the next generation of leaders, and creates new knowledge and technologies that transform our future."