

Thomas Tubon, Madison College

1. **Stem Cell Technologies Certificate:** This is a 16-week certificate program offered at Madison College that is designed around the development of workforce-anchored skills, knowledge and abilities to support skilled technical workers in the stem cell and cell-based manufacturing space. As a CMaT REM, we have leveraged the experience and integrated pioneering research findings and techniques into the core instructional curricula. The experience as part of CMaT EWD efforts has provided resources to rapidly update instructional materials to reflect current state-of-the-art research and methods relevant to the cell manufacturing space.

2.

a. Course Development: Intro Stem Cell Technologies Concepts

This one credit course is designed around 16 class sessions and covers fundamental concepts for students entering into the stem cell and regenerative medicine sector as skilled technical workers. The topics explore key scientific discoveries, industry needs assessments, government regulations, quality systems, signaling pathways, and biological basis for cell pluripotency and differentiation. With new knowledge acquired through the CMaT REM, the course content was updated to reflect advances in cell manufacturing that are key to establishing a relevant, well-prepared workforce.

Sample Course Schedule (See attached).

b. Course Development: Advanced Stem Cell Concepts

This one credit course is designed around 16 class sessions and explores applications in stem cell technologies that in current practice in scientific research and industrial manufacturing environments. The course content includes a deeper dive into the scientific literature to explore principles of cell differentiation, genome-based engineering, engineering principles for cell manufacturing, cell manipulation and processing, and current applications in research and therapeutic development. The CMaT REM experience has enabled the addition of new information to the course, including CAR-T Cell therapeutics, 3D Cell scaffolding and matrices, scalable processes for cell manufacturing, 3D bioprinting of tissues, supply chain logistics, and global economic impacts.

Sample Course Schedule (see attached).

c. Course Development: Stem Cell Technologies Methods

This hands-on lab course is designed around 192 hours of instructional hands-on laboratory to address core competencies identified by industry and academic laboratories. This includes aseptic techniques, cGMP, GLP, cryopreservation, cell culturing, cell counting, light and fluorescence imaging, characterizing and manipulation of cells, media formulation, and 3D culturing techniques. Through direct work with CMaT Research Professors (Dr. R. Ashton, Dr. S. Palecek, and Dr. B. Murphy), we

adapted the course curriculum to include laboratory experiments for Neural Differentiation, Cardiomyocyte Differentiation, and cell scaffolding. Sample Course Schedule (see attached).

3. Online Resources for Stem Cells and Cell Manufacturing. As part of our collaboration with the CMat REM, we are currently developing online accessible modules for instruction that are built into the Canvas LMS platform. This work includes the conversion of learning materials to resources that are formatted for self-paced asynchronous instruction.