Career Opportunities

The certificate will prepare students for positions in the biotechnology, pharmaceutical, and medical research industry such as:

Research and Development

- **Laboratory Technicians** calibrate lab equipment, run protocols and experiments, analyze data, and write reports.
- **Research Associates** prepare protocols and experiments , perform data analysis and results interpretation, and write technical reports.

Biomanufacturing Technicians

- **Upstream Processing Technicians** work in a biomanufacturing facility to produce proteins in cells using Good Manufacturing Practices.
- **Quality Control Technicians** carry out routine and non-routine analysis of materials and products.

Other Technicians

- **Cell Culture Technicians** culture animal cells for basic research and pharmaceutical products, duties include preparing cell growth media, reagents, buffers, and stains following standard operating procedures.

Employment Prospects

Regionally, employment of biological technicians is expected to increase by about 16% from 2012 to 2022.*

Regional Median Annual Salary	$49,510
Number Employed in 2012	2,380
Projected Number Employed in 2020	2,760

*According to the Pennsylvania Bureau of Labor Statistics for the greater Philadelphia 5-county region.

Grant-Funded Support

The NBC2 is a national collaborative funded by NSF Award #1204974, which includes MCCC, six additional community colleges, industry representatives, and educational partners. The NBC2 strives to promote, create, and sustain a highly-qualified biomanufacturing workforce. MCCC serves as the lead hub for this Center of Excellence to provide industry-endorsed skill-standards, curriculum, and instructional materials to program participants in order to train and mentor technicians for successful placement into local job opportunities.

The Community College Consortium for Bioscience Credentials (c3bc) is an educational initiative funded by the U.S. Department of Labor, grant TC-23761-12-60-A-37. This nationwide consortium consists of 12 community colleges, with MCCC serving as the biomanufacturing hub school. The consortium seeks to improve the training of participants for entry into high-paying jobs.

Contact Information

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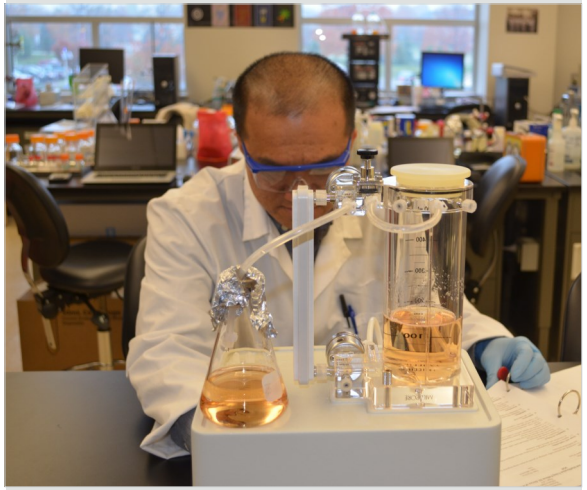
Biotechnology and Biomanufacturing

16-Credit Certificate of Completion



Montgomery County Community College

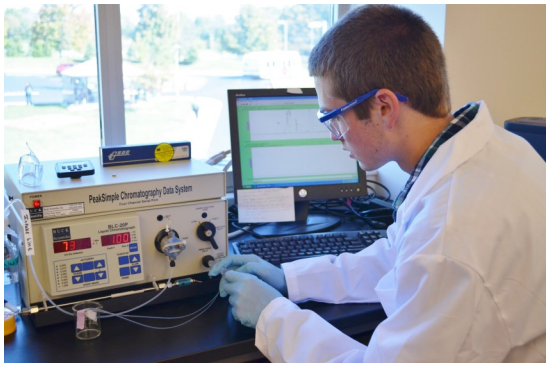
Biotechnology Program

This program is designed to prepare graduates for employment at biotechnology and pharmaceutical companies, as well as research and quality control laboratories. The areas for career opportunities include but are not limited to: basic research in a drug discovery or academic environment, biomanufacturing, and clinical development.

Students will be trained to perform basic biotechnology laboratory procedures; operate and maintain laboratory equipment, such as centrifuges, pH meters, analytical balances, laminar flow hoods, light microscopes, and spectrophotometers; and perform advanced techniques in biomanufacturing and cell culture. Students are required to successfully complete 4 courses (16 credits).

Course of Study		Credits
BIT 120	Introduction to Biotechnology	4
	Or	
BIO 121	General Biology I	4
	Or	
CHE 131	Chemistry for Technology I	4
BIT 123	Techniques and Instrumentation for Biotechnology	4
BIT 220	Biotechnology Research	4
BIT 232	Biomanufacturing	4
Total Credits		**16**

Montgomery County Community College



Course Descriptions

The 16-credit Certificate of Completion is comprised of four biotechnology courses. It is intended for individuals with a prior degree, it will build upon principles of biology and chemistry acquired at the baccalaureate or associate's level.

BIT 120 - Introduction to Biotechnology
This course is designed to acquaint students with the field of biotechnology. Topics will include medical biotechnology, the drug discovery and development processes, and forensics. Techniques of the biotechnology industry, such as recombinant DNA technology, aseptic technique, bacterial transformation and protein purification shall be introduced. Issues that impact both the industry and the general population such as stem cell research, bioterrorism and bioethics are examined.

Note, BIO 121 or CHE 131 may be substituted for BIT 120 with approval from the Biotechnology Program Coordinator.

Course Descriptions

BIT 123 - Biotechnology Techniques and Instrumentation
This course will allow students to gain theoretical and practical, hands-on knowledge of the operation, maintenance and calibration of commonly used and specialized laboratory instrumentation. Laboratory procedures will include solution preparation, aseptic technique, protein separations and assays, electrophoresis and recombinant DNA technology. The students be introduced to the concept of working with good laboratory practices as they pertain to documentation and record keeping. Discussion and implementation of laboratory safety policies will be key components to the entire course.

BIT 220 - Biotechnology Research
This course provides a foundation for the principles of molecular genetics as they apply to research performed in the biotechnology industry. Lectures topics will include transcription, translation, and protein expression as they pertain to both prokaryotic and eukaryotic gene regulation. The laboratory will give hands on exposure to recombinant DNA technology such as cloning techniques (restriction digests, PCR, plasmid design, DNA purification, ligation, transformation and gel electrophoresis), protein purification, ELISA, Western Blot and bacterial and mammalian cell culture.

BIT 232 - Biomanufacturing
This course provides a solid foundation in the biomanufacturing process of biopharmaceuticals, including producing them under current Good Manufacturing Practices. Students use bacteria, mammalian, and/or yeast cells to produce human proteins using the tools of manufacturing, such as bioreactors for upstream processing and protein purification systems for downstream processing and quality control of protein production.