



Biotechnology CIP Code 26.1201

Introduction – Program of Study

Swift advances in basic medical knowledge related to genetics and organic molecules have spurred growth in the field of biotechnology. Discovery of important drugs, including human insulin and growth hormone, is the result of research using biotechnology techniques, such as recombining deoxyribonucleic acid (DNA). Many other substances not previously available in large quantities are now produced by biotechnological means, some may one day be useful in treating diseases such as Parkinson's or Alzheimer's. Today, many medical scientists are involved in the science of genetic engineering, used for isolating, identifying, and sequencing human genes to determine their functions. This work continues to lead to the discovery of genes associated with specific diseases and inherited health risks, such as sickle cell anemia. These advances in biotechnology have opened up research opportunities in almost all areas of medical science.

Advances in biotechnology are transforming drug discovery and development. Bioinformatics, a branch of biotechnology using information technologies to work with biological data like DNA, is a particularly dynamic area of work. Scientists have learned a great deal about human genes, but the real challenge of translating such knowledge into viable new drugs has only recently begun. So far, millions of people have benefited from medicines and vaccines developed through biotechnology, and several hundred new biotechnologically derived medicines are currently in the pipeline. These new medicines, all of which are in human clinical trials or awaiting FDA approval, include drugs for cancer, infectious diseases, autoimmune diseases, neurologic disorders, and HIV/AIDS and related conditions.

Advances in manufacturing processes are also impacting biotechnology. While pharmaceutical manufacturers have long devoted resources to new drug development as a source for future profits, firms are increasingly realizing that improvements through the drug pipeline are needed to stay competitive. Along with other manufacturing industries, pharmaceutical manufacturers are realizing that quality products can best be produced when quality improvements occur at all stages and when processes are continually updated with the latest technologies and methods. Controlling the product flow through the supply chain also ensures that valuable resources do not sit idle but are put to work, and that final products reach consumers without delay.

This program provides experience in the procedures, methods and equipment common to medical technology laboratories. This hands on laboratory program uses state of the art

equipment to learn the principles of scientific investigation as applied to medicine, forensics, agriculture, genetic engineering and environmental health. Specific protocols include DNA fingerprinting, polymerase chain reaction (PCR) microbiology and immunology. Students entering this program should have a strong interest in science and be able to perform basic math and computer skills. Interested students should enjoy hands on laboratory work. They must pay close attention to detail and be able to accomplish accurate and precise work. Students should be ready to work independently or as team players and be able to work well under pressure.

Assumptions of this Program of Study

High quality programs should meet the following standards:

1. Promote positive working relationships.
2. Implement a curriculum that fosters all areas of skill development
3. Use appropriate and effective teaching approaches.
4. Provide ongoing assessments of student progress.
5. Employ and support qualified teaching staff.
6. Establish and maintain relationships and use resources of the community.
7. Provide a safe and healthy learning environment.
8. Implement strong program organization and supervision policies that result in high quality teaching and learning.
9. Integrate academic skills and aptitudes necessary for postsecondary education, gainful employment and a foundation of lifelong learning.

CIP Code

26.1201 Biotechnology

This is an instructional program that focuses on the application of the biological sciences, biochemistry and genetics in preparation of new and enhanced agricultural, environmental, clinical and industrial products including the commercial exploitation of microbes, plants and animals. This program may include instruction in bioinformatics, gene identification, phylogenetics and comparative genomics, bioinorganic chemistry, immunoassaying, DNA sequencing, xenotransplantation, genetic engineering, industrial microbiology, drug and biologic development, enzyme based production process, patent law and biotechnology management and marketing, applicable regulations and biotechnology ethics.

For more information, contact:

The Pennsylvania Department of Education
Bureau of Career and Technical Education
333 Market Street, 11th Floor
Harrisburg, PA 17126-0333
Phone: 717-346-9735
Fax: 717-783-6672
TTY: 717-783-7445