BIOSCIENCE TECHNOLOGY

Rock Creek Campus
Building 7, Room 202
971-722-7254
pcc.edu/bio

CAREER AND PROGRAM DESCRIPTION

Bioscience Technology refers to the research, development, and manufacturing of products which use the processes, products or principles of living organisms to solve problems. The applications of bioscience range from developing and manufacturing better ways to diagnose and treat disease, to improving the production of plant crops, and even using microorganisms to clean up toxic wastes. The field is dynamic, employing applications and innovations that in many cases cut across traditional disciplines. Skilled technicians with broad-based laboratory training find employment in a variety of settings, working with scientists at all levels in research, development, manufacturing, testing, and quality control and assurance. Technicians are needed in both large and small companies, research institutions, at local and state agencies, in private service laboratories and in some related industries.

Course work in the Bioscience program involves four distinct elements. Basic science courses provide the background information so that technical elements can be more completely understood. The foundation course work provides a broad base of technical knowledge that prepares individuals for entry-level positions in a variety of Bioscience companies, and includes emphasis on working in a regulated environment, as well as developing skill in technical communication and job readiness. The core of these foundation courses make up the Bioscience Technician Certificate. The advanced technical courses develop more specific skill sets, and provide for development of the fundamental skills in this more advanced context. Students may choose some electives from outside of the BIT program, in order to increase the breadth of training or focus on a specific sector of the bioscience industry. Students have the option to put their skills and knowledge into a working context through a work experience component. Certificate students must achieve an overall GPA of 2.0 in all required bioscience courses.

DEGREES AND CERTIFICATES OFFERED

ASSOCIATE OF APPLIED SCIENCE DEGREE

Bioscience Technology

LESS THAN ONE-YEAR: CAREER PATHWAY CERTIFICATE

Bioscience Technician
Advanced Bioscience Technologist

Academic Prerequisites

- AAS Bioscience Technology: Completion of MTH 95, WR 121 , Biology (BI 112 or BI 211 or equivalent), and Chemistry (CH 151 or CH 221 or equivalent), each with a grade of "C" or "P" or better
- Bioscience Technician Certificate: Placement into IRW 115 or (WR 115 and RD 115) and MTH 95 .
- Advanced Bioscience Technologist Certificate: Placement into WR 121 , and MTH 95 .
- The Bioscience Technology program is a restricted entry program with limited enrollment. Contact the department for instructions.

Academic Requirements

- Students must achieve an overall GPA of 2.0 in order to earn the certificate.

Non-Academic Prerequisites

- None

Non-Academic Requirements

- None

BIOSCIENCE TECHNOLOGY AAS DEGREE

Minimum 90 credits. Students must also meet Associate Degree Comprehensive Requirements and Associate of Applied Science Requirements. Students must complete a total of sixteen credits of General Education. Some courses specified within the program may be used as General Education. In addition to required courses in the program of study, students must satisfy MTH 58/65 competency. A Cooperative Education experience is not required, however, it is strongly encouraged. Students should consult with program advisors for course planning.

BIOSCIENCE TECHNOLOGY DEGREE COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BI 112</td>
<td>Cell Biology for Health Occupations *</td>
<td>5</td>
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<tr>
<td>or BI 211</td>
<td>Principles of Biology</td>
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<tr>
<td>BIT 102</td>
<td>Current Topics in Bioscience Technology</td>
<td>2</td>
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<tr>
<td>BIT 105</td>
<td>Safety in the Bioscience Workplace</td>
<td>2</td>
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<tr>
<td>BIT 107</td>
<td>Bioscience Lab Math</td>
<td>2</td>
</tr>
<tr>
<td>BIT 109</td>
<td>Basic Laboratory Techniques and Instruments</td>
<td>5</td>
</tr>
<tr>
<td>BIT 125</td>
<td>Quality Systems in Bioscience Technology</td>
<td>2</td>
</tr>
<tr>
<td>BIT 126</td>
<td>Applied Quality Practice</td>
<td>3</td>
</tr>
<tr>
<td>BIT 181</td>
<td>Exploring Bioscience</td>
<td>3</td>
</tr>
<tr>
<td>CAS 170</td>
<td>Beginning Excel</td>
<td>3</td>
</tr>
<tr>
<td>CH 151</td>
<td>Preparatory Chemistry *</td>
<td>5</td>
</tr>
<tr>
<td>or CH 221</td>
<td>General Chemistry I</td>
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<td>WR 121</td>
<td>English Composition</td>
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<td>Basic Science Electives</td>
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<tr>
<td>Bioscience Degree Electives</td>
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<tr>
<td>Remaining General Education</td>
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Total Credits 90

* Could be used as General Education.

BASIC SCIENCE ELECTIVES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BI 121</td>
<td>Introduction to Human Anatomy &amp; Physiology I</td>
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<tr>
<td>BI 211</td>
<td>Principles of Biology *</td>
<td>5</td>
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<tr>
<td>BI 212</td>
<td>Principles of Biology *</td>
<td>5</td>
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<tr>
<td>BI 213</td>
<td>Principles of Biology *</td>
<td>5</td>
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<tr>
<td>BI 222</td>
<td>Human Genetics</td>
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</tr>
<tr>
<td>BI 231</td>
<td>Human Anatomy &amp; Physiology I</td>
<td>4</td>
</tr>
<tr>
<td>BI 234</td>
<td>Microbiology</td>
<td>5</td>
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<tr>
<td>CH 211</td>
<td>Introduction to Biochemistry *</td>
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<tr>
<td>CH 221</td>
<td>General Chemistry I *</td>
<td>5</td>
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<tr>
<td>CH 222</td>
<td>General Chemistry II *</td>
<td>5</td>
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<tr>
<td>CH 223</td>
<td>General Chemistry III *</td>
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<td>MTH 243</td>
<td>Statistics I</td>
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<tr>
<td>MTH 244</td>
<td>Statistics II</td>
<td>4</td>
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<tr>
<td>PHY 201</td>
<td>General Physics *</td>
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<tr>
<td>PHY 202</td>
<td>General Physics</td>
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<tr>
<td>PHY 203</td>
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<tr>
<td>PHY 204</td>
<td>General Physics</td>
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BIOSCIENCE TECHNOLOGY 2018-19

* Could be used as General Education.
1 Students who are interested in transferring to PSU for a BS degree in Biology will need to complete BI 211, BI 212, BI 213, CH 221, CH 222, and CH 223 in order to be eligible for placement in upper-division Biology and Chemistry courses at PSU.

** Advanced Bioscience Technologist (p. 2)
Bioscience Technician (p. 2)

** Advanced Bioscience Technologist Career Pathway Certificate
Minimum 29 credits. Students must meet all certificate requirements. The Advanced Bioscience Technologist certificate is a Career Pathway. All courses are contained in the Bioscience Technology AAS Degree.

** Advanced Bioscience Technologist Certificate Courses
Code Title Credits
BIT 102 Current Topics in Bioscience Technology 2
BIT 105 Safety in the Bioscience Workplace 2
BIT 107 Bioscience Lab Math 2
BIT 109 Basic Laboratory Techniques and Instruments 5
BIT 125 Quality Systems in Bioscience Technology 2
BIT 126 Applied Quality Practice 3
BIT 181 Exploring Bioscience 3
Advanced Bioscience Technology Electives 10
Total Credits 29

** Advanced Bioscience Technologist Electives
Code Title Credits
BIT 201 Immunochemical Methods 5
BIT 203 Recombinant DNA 5
BIT 205 Bioseparations 5

** BIOSCIENCE TECHNICIAN CAREER PATHWAY CERTIFICATE
Minimum 19 credits. Students must also meet certificate requirements. The Biotechnician certificate is a Career Pathway. All courses are contained in the Bioscience Technology AAS Degree.

** BIOSCIENCE TECHNICIAN CERTIFICATE COURSES
Code Title Credits
BIT 102 Current Topics in Bioscience Technology 2
BIT 105 Safety in the Bioscience Workplace 2
BIT 107 Bioscience Lab Math 2
BIT 109 Basic Laboratory Techniques and Instruments 5
BIT 125 Quality Systems in Bioscience Technology 2
BIT 126 Applied Quality Practice 3
BIT 181 Exploring Bioscience 3
Total Credits 19

** BIOT 102. Current Topics in Bioscience Technology. 2 Credits.
Provides an overview of current topics in Bioscience Technology. Includes recombinant DNA technology, bioremediation, forensics, genetically modified organisms (GMO), stem cell technology, pharmaceutical drug discovery and medical devices as well as ethical and legal issues surrounding biotechnology today. Recommend: BI 112 or BI 211 or equivalent. Audit available.

** BIOT 105. Safety in the Bioscience Workplace. 2 Credits.
Survey of technical and regulatory aspects of physical, chemical, radiation and biological safety in the bioscience laboratory. Topics covered include: mechanical and electrical systems, hazards due to temperature and pressure, handling and storing hazardous chemicals, personal protective equipment, chemical waste disposals and spill, ionizing radiation and control measures, biological containment, disinfection/sterilization, medical waste handling, applicable regulations and guidelines. Prerequisites: Placement into WR 115 and RD 115. Audit available.

** BIOT 107. Bioscience Lab Math. 2 Credits.
Develops mathematics skill and problem-solving related to work in a bioscience laboratory or biomanufacturing environment. Includes calculations for solution preparation, analysis and manipulation of molecules and cells, analysis and interpretation of data and commonly used statistical methods. Prerequisite: MTH 65 or placement into MTH 95. Recommend: Prior or concurrent college-level course in Chemistry, or BI 112 or 211. Audit available.

** BIOT 109. Basic Laboratory Techniques and Instruments. 5 Credits.
Introduces fundamental principles and practices for the bioscience laboratory. Principles of quality documentation, safety, and precise communication will be emphasized throughout, in the context of technical activities that include solution preparation, instrumentation for measurements (weight, volume, temperature, pH, conductivity and spectroscopy), assay techniques and routine laboratory maintenance. Recommend prior or concurrent college level course in Chemistry, or BI 112 or 211, and MTH 65. Prerequisite: Placement into WR 115 and RD 115. Prerequisite/concurrent: BIOT 105 and BIOT 107. Audit available.

** BIOT 125. Quality Systems in Bioscience Technology. 2 Credits.
Introduction to internal and external quality systems that apply to the bioscience industry, with emphasis on working in a regulated environment. Also covers various agencies that regulate the bioscience industry. FDA regulation for good laboratory and manufacturing practices (GLP and cGMP), and processes relating to product approval. Audit available.

** BIOT 126. Applied Quality Practice. 3 Credits.
Introduces concepts and skills that are needed by entry level workers in the regulated bioscience and related work environments. Emphasize validation, compliance, CAPA, audit, LEAN work habits, material and product control and coordinated quality teamwork through laboratory-based activities. Prerequisites: BIOT 125 and BIOT 109 or instructor permission. Audit available.
BIT 181. Exploring Bioscience. 3 Credits.
Provides an overview and analysis of various Bioscience Technology work environments including research, development, and manufacturing. Covers career options, pathways, and development of skills that are needed for identification and procurement of entry level positions, education, and training opportunities in the bioscience field. Includes portfolio development and refinement of job search, resume writing and interview skills. Participation in field trips is required. Recommended: completion or concurrent enrollment in BIT 125. Prerequisite/concurrent: BIT 109 or instructor permission. Audit available.

BIT 201. Immunochemical Methods. 5 Credits.
Introduces the general properties and uses of antibody molecules. Includes an overview of immune responses, biosynthesis of immunoglobulin, obtaining, purifying and labeling antibodies, and using antibodies in a variety of common applications (ELISA, western blot, immunoprecipitation and immunocytochemistry, antibody-based affinity chromatography). Prerequisite: BIT 109 or instructor permission. Audit available.

BIT 203. Recombinant DNA. 5 Credits.
Provides a laboratory-intensive experience focusing on the strategies and techniques used in recombinant DNA work. Covers vector and insert options and preparation, quantitation of DNA, ligation and transformation procedures, and analysis by restriction digest, blot hybridization and PCR. Prerequisite: BIT 109 or instructor permission. Audit available.

BIT 205. Bioseparations. 5 Credits.
Introduces commonly used methods for separation of biological molecules for both analytical and preparative applications. Covers the principles of and practice in filtration, differential precipitation, and electrophoretic and chromatographic techniques within a laboratory setting. Prerequisite: BIT 109 or instructor permission. Audit available.

BIT 207. Cell Culture. 5 Credits.
Introduces the practice and process of culturing animal cells and cell lines in a laboratory. Focuses on routine maintenance and record-keeping, including media preparation, cryopreservation, and troubleshooting common culture problems. Prerequisite/concurrent: BIT 109 or instructor permission. Audit available.

BIT 215. Protein Purification. 5 Credits.
Application of commonly used methods for separation of biological molecules in multi-step protein purifications. This laboratory intensive course will focus on issues of recovery and yield, step-to-step analysis and troubleshooting, as well as documentation and reporting procedures and results. Prerequisite: BIT 205 or instructor permission. Audit available.

BIT 223. Advanced DNA Techniques. 5 Credits.
Laboratory-intensive course focusing on the theory and practice of techniques for analysis and manipulation of nucleic acids. Topics include construction and use of plasmid and phage libraries, DNA sequence determination and analysis, bioinformatics, and applications of PCR. Prerequisites: BIT 203 or instructor permission. Audit available.

BIT 279. Preparation for Work Experience in Bioscience Technology. 1 Credit.
Covers essential skills and practices for the procurement of a work site for co-operative education. Focuses on company research, career exploration, identification of learning objectives, and job applications. Prerequisite: BIT 126 and BIT 181.

BIT 280A. Work Experience. 1-8 Credit.
Provides an opportunity to work in a biotechnology laboratory, supervised by professionals on site and by program instructor(s). Department permission required. Prerequisite: BIT 279.