Bioscience Technology & Bioscience Certificate (BSC & BSCC)

Bioscience Technology (BSC)

Bioscience technicians perform procedures in chemical and biotechnology laboratories, pharmaceutical manufacturing facilities, and research laboratories. Students who successfully complete the Bioscience Technology program at Cincinnati State earn an Associate of Applied Science degree while developing the skills important to a successful career in bioscience or biotechnology. These skills include advanced knowledge of biology and chemistry, microbiology, and laboratory techniques.

The curriculum prepares graduates for entry-level employment in bioscience or biotechnology, or for transfer to a bachelor's degree program in biological science or related fields.

Students entering the Bioscience Technology program should have a strong background in or aptitude for the sciences, a willingness to follow structured methods, ability to explore molecules and cells, and a desire to help people and enhance the world through the use of biotechnology.

Bioscience Certificate (BSCC)

The Bioscience Certificate is designed for students exploring a new career path in the biotechnology industry. The certificate curriculum contains less rigorous biology and chemistry requirements than the Bioscience associate's degree program, but has the same laboratory skills courses.

Students who earn the Bioscience Certificate gain experience in aseptic technique, genetic engineering, DNA forensics, protein isolation, DNA electrophoresis technology, and PCR (polymerase chain reaction).

Employees in biotechnology fields are expected to pay close attention to detail, follow detailed protocols, and have the ability to work in clean environments. Employment opportunities for graduates include working as laboratory assistants or technicians in a wide range of industries such as food and flavor testing, pharmaceutical production, microbiological analysis, water quality analysis, and sample management.

For more information, please contact the Health and Public Safety Division at (513) 569-1670.

To apply for this program at Cincinnati State, visit the Admissions (http://www.cincinnatistate.edu/academics/admission) section of the College website.

Bioscience Technology (BSC)

Semester 1		**Lec**	**Lab**	**Credits**
ENG 101	English Composition 1 (**G**)	3	0	3
BSC 108	Bioscience Skills and Regulations (**B**)	3	3	4
BIO 131	Biology 1 (**G**)	3	4	5
FYE 1XX	First Year Experience Elective (**B**)	1	0	1
Semester 2				
BSC 115	Bioscience Laboratory Methods (**T**)	2	3	3
BIO 132	Biology 2 (**B**)	3	4	5
ENG 104	English Composition 2: Technical Communication (**G**)	3	0	3
Semester 3				
MAT 151	College Algebra (**G**)	4	0	4
CHE 121	General Chemistry 1 (**B**)	4	0	4
CHE 131	General Chemistry 1 Lab (**B**)	0	3	1
BSC 150	Scientific Literacy for Bioscience (**B**)	2	0	2
XXX XXX	Arts/ Humanities Elective or Social/ Behavioral Science Elective (**G**)	3	0	3
Semester 4				
BSC 205	Molecular Genetics Laboratory (**T**)	2	6	5
CHE 122	General Chemistry 2 (**T**)	4	0	4
CHE 132	General Chemistry 2 Lab (**T**)	0	3	1
BIO XXX	Biology Elective (**T**)	3	0	3
Semester 5				
BSC 210	Protein Purification and Analysis (**T**)	2	6	5
XXX XXX	Bioscience Elective (**T**)	1	2	2
CHE XXX	Organic Chemistry Elective (**T**)	4	0	4
Semester 6				
BSC XXX	Bioscience Experiential Learning Elective (**T**)	1	20	1
Total Credits:		48	54	63

Electives

First Year Experience Elective		
FYE 100	College Survival Skills	1
FYE 105	College Success Strategies	2
FYE 110	Community College Experience	3
Biology Elective		
BIO 220	Microbiology	3

BIO 230	Pharmacology	3
BIO 240	Pathophysiology	3
BIO 250	Cell Biology	5
BIO 260	Genetics	5
BIO 270	Ecology	5
BIO 275	Animal Behavior	5
Bioscience Elective		
BSC 120	Cell Culture	2
BSC 160	Quality and Compliance in Biomanufacturing	3
BSC 230	Introduction to Bioinformatics	3
MET 230	Quality Control and Six Sigma	4
EVT 168	Radiation Safety	2
EVT 170	Water and Wastewater Treatment and Analysis	4
Organic Chemistry Elective		
CHE 111	Bio-Organic Chemistry	4
CHE 201 & CHE 211	Organic Chemistry 1 and Organic Chemistry 1 Lab	5
Arts/Humanities Elective or Social/Behavioral Science Elective		
CULT 105	Issues in Human Diversity	3
CULT 110	Social Issues in Technology	3
PHI 110	Ethics	3
PSY 100	Applied Psychology: Human Relations	3
PSY 102	Applied Psychology: Stress Management	3
PSY 110	Introduction to Psychology	3
SOC 100	Survey of Social Issues	3
SOC 105	Introduction to Sociology	3
Bioscience Experiential Learning Elective		
BSC 280	Bioscience Capstone Project	2
BSC 191	Part-Time Cooperative Education 1: Bioscience	1
BSC 291	Full-Time Cooperative Education 1: Bioscience	2
BSC 294	Internship 1: Bioscience	2

The letters G, B, and T (displayed after course titles or elective descriptions) identify types of courses required by the Ohio Department of Higher Education as part of an associate's degree curriculum.

G = General Education course in this curriculum

B = Basic Skills course in this curriculum

T = Technical course in this curriculum

Bioscience Certificate

Program Prerequisite: AFM 097 (minimum grade C) or appropriate placement test score

Semester 1		**Lec**	**Lab**	**Credits**
BSC 108	Bioscience Skills and Regulations	3	3	4
BIO 111	Biology: Unity of Life	3	2	4
MAT 151	College Algebra	4	0	4
ENG 101	English Composition 1	3	0	3
Semester 2				
CHE 110	Fundamentals of Chemistry	3	3	4
BSC 115	Bioscience Laboratory Methods	2	3	3
BIO 115	Human Genetics	3	0	3
BSC 280	Bioscience Capstone Project	0	4	2
COMM 110	Public Speaking	3	0	3
Total Credits:		24	15	30

Bioscience Technology (BSC)

- Demonstrate knowledge related to laboratory safety.
- Demonstrate knowledge of and practice aseptic technique.
- Demonstrate knowledge of and practice GDP/GLP/GMP – Good Documentation Procedures, Good Laboratory Procedures, and Good Manufacturing Procedures.
- Set up and conduct experiments, tests, and analysis using techniques such as pipetting, cell culture, enzymatic reactions, DNA extraction and isolation, gel electrophoresis, polymerase chain reactions, and protein purification microbiological techniques.
- Demonstrate ability to effectively follow a Standard Operating Procedure.
- Demonstrate ability to effectively write a Standard Operating Procedure.
- Evaluate and analyze data.
- Present data in a way that effectively supports hypotheses.
- Write in a scientific manner.
- Present research to peers and incorporate criticism.

Faculty

Advisor

Professor Gregory Klein, MS
gregory.klein@cincinnatistate.edu

Courses

BSC 100 Survey of Bioscience and Biotechnology
2 Credits. 2 Lecture Hours. 0 Lab Hour.
An introductory course on the disciplines and scope of bioscience and biotechnology. Topics include: applications of bioscience and biotechnology, medical advances, bioethics, current developments, and career opportunities.
Prerequisites: AFL 085 and AFM 092, or appropriate placement test scores

BSC 108 Bioscience Skills and Regulations
4 Credits. 3 Lecture Hours. 3 Lab Hours.
A course on bioscience techniques and workplace regulations required for safe laboratories and related work environments. Topics include: documentation, calculations, aseptic techniques, safety, standard operating procedures (SOP), FDA regulations, and good manufacturing practices (GMP).
Prerequisites: AFL 085 and AFM 092 or appropriate placement test scores, and high school Biology within the past 5 years (minimum grade C for all)

BSC 115 Bioscience Laboratory Methods
3 Credits. 2 Lecture Hours. 3 Lab Hours.
A course on techniques used in bioscience laboratories. Topics include: microscopy, aseptic technique, growth and identification of microbes, spectroscopy, genetic transformation, DNA isolation, and troubleshooting experiments.
Prerequisites: BSC 108, and BIO 111 or BIO 131, and CHE 100 or high school Chemistry within the past 7 years, and ENG 101 (minimum grade C for all)

BSC 120 Cell Culture
2 Credits. 0 Lecture Hour. 6 Lab Hours.
A course on skills and techniques necessary to perform cell culture. Topics include: cell counts, biosafety, plant culture, yeast culture, mammalian cell culture, and fermentation techniques.
Prerequisites: BSC 115

BSC 150 Scientific Literacy for Bioscience
2 Credits. 2 Lecture Hours. 0 Lab Hour.
A course on reading, writing, and speaking skills for science professionals. Topics include: style and structure for scientific journal articles, the peer review process, and oral presentations of scientific information.
Prerequisites: None

BSC 160 Quality and Compliance in Biomanufacturing
3 Credits. 3 Lecture Hours. 0 Lab Hour.
A course on quality assurance elements in biomanufacturing industries. Topics include: current Good Manufacturing Practices (cGMPs), lean manufacturing and Six Sigma, root cause analysis, validation and calibration, and regulatory compliance. Students must attend field trips to local biomanufacturing companies.
Prerequisites: BSC 108

BSC 191 Part-Time Cooperative Education 1: Bioscience
1 Credit. 1 Lecture Hour. 20 Lab Hours.
Students seeking an associate's degree participate in their first part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures in order to earn credit. Grades issued are Satisfactory or Unsatisfactory.
Prerequisites: BIO 132 and (BSC 205 or BSC 210) (minimum grade C for all)

BSC 198 First Year Special Topics in Bioscience
1-9 Credits. 0 Lecture Hour. 0 Lab Hour.
A course on selected topics related to Bioscience, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.
Prerequisites: None

BSC 199 First Year Independent Project in Bioscience
1-9 Credits. 0 Lecture Hour. 0 Lab Hour.
A project related to Bioscience that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Bioscience faculty. Grades issued are Satisfactory or Unsatisfactory.
Prerequisites: Vary by section

BSC 205 Molecular Genetics Laboratory
5 Credits. 2 Lecture Hours. 6 Lab Hours.
A course on molecular genetics techniques. Topics include: DNA and RNA isolation and purification, constructing screening libraries, electrophoresis, vector construction, Southern blot, PCR, DNA sequencing, and microarrays.
Prerequisites: BSC 115, and MAT 121 or MAT 151 (minimum grade C for all)
Instructor Consent Required

BSC 210 Protein Purification and Analysis
5 Credits. 2 Lecture Hours. 6 Lab Hours.
A course on isolation, purification, and analysis of proteins from cells. Topics include: chromatography, electrophoresis, Western blot, enzyme assays, proteomics, ELISA and other immunochemistry methods for detecting proteins.
Prerequisites: BSC 115, and MAT 121 or MAT 151 (minimum grade C for all)

BSC 230 Introduction to Bioinformatics
3 Credits. 3 Lecture Hours. 0 Lab Hour.
A course on computer applications, statistics, and genetics used in computational biology and bioinformatics. Topics include: the Human Genome and Human Proteome projects, multiple sequence analysis, genetic conditions and trends, and use of databases such as BLAST, FASTA, and Entrez.
Prerequisites: BIO 111 or BIO 131

BSC 280 Bioscience Capstone Project
2 Credits. 0 Lecture Hour. 4 Lab Hours.
Students design and perform a project under the supervision of a Bioscience instructor. Topics include: planning a budget, and documenting project results.
Prerequisites: BIO 132, and (BSC 205 or BSC 210)

BSC 291 Full-Time Cooperative Education 1: Bioscience
2 Credits. 1 Lecture Hour. 40 Lab Hours.
Students seeking an associate's degree participate in their first full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.
Prerequisites: BIO 132 and (BSC 205 or BSC 210) (minimum grade C for all)

BSC 294 Internship 1: Bioscience
2 Credits. 1 Lecture Hour. 40 Lab Hours.
Students seeking an associate's degree participate in their first unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issues are Satisfactory or Unsatisfactory.
Prerequisites: BIO 132, BSC 205, or BSC 210 (minimum grade C for all)

BSC 298 Second Year Special Topics in Bioscience
1-9 Credits. 0 Lecture Hour. 0 Lab Hour.
A course on selected topics related to Biology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.
Prerequisites: None

BSC 299 Second Year Independent Project in Bioscience
1-9 Credits. 0 Lecture Hour. 0 Lab Hour.
A project related to Bioscience that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Bioscience faculty. Grades issued are Satisfactory or Unsatisfactory.
Prerequisites: Vary by section