Biotechnology, AAS

Entry Requirements for the Certificate with AAS degree options

1. Complete an application for admission jointly into the Biotechnology Program and either the Agribusiness or Horticulture Program, depending on degree option below.
2. Satisfy requirements 2 through 4 as listed for the Certificate with AS degree.

Agronomy AAS

The Biotechnology–Agronomy Concentration AAS degree is designed to prepare students to work in biotechnology laboratories and production agriculture or find employment as a farm management specialist. Note: Graduates of the Biotechnology–Agronomy AAS degree qualify to be awarded both **Agribusiness Agronomy Certificate** and the **Biotechnology Laboratory Methods Certificate.**

Animal Science AAS

The Biotechnology–Animal Science AAS degree is designed to prepare students to work in agricultural industries and research laboratories. Note: Graduates of the Biotechnology - Animal Science AAS degree qualify to be awarded both **Agribusiness Animal Science Certificat**e and the **Biotechnology Laboratory Methods Certificate.**

Greenhouse Production AAS

The Biotechnology–Greenhouse Production AAS degree is designed to prepare students to work in agricultural and horticultural laboratories, greenhouses, and field sites. Note: Graduates of the Biotechnology–Greenhouse Production AAS degree qualify to be awarded both the **Horticulture Greenhouse Production Certificate** and the **Biotechnology Laboratory Methods Certificate.** See **biotech.dmacc.edu** for AAS course details.

Location

Ankeny (Selected courses in this program are offered at other campuses.)

Graduation Requirements

To earn the Certificate with AS degree a student must be accepted into the Liberal Arts Program in the Biotechnology area of focus, complete all coursework as prescribed, and maintain a 2.0 grade point average. Students must meet the Diversity Requirement with a grade of "C" or higher. See the AS section of the catalog for more information about which courses count toward this requirement.

To earn a Biotechnology AAS degree, a student must be accepted into the Biotechnology program, complete all coursework as prescribed, and maintain a 2.0 grade point average. Students must meet the Diversity Requirement with a grade of "C" or higher. See the AAS section of the catalog for more information about which courses can count toward this requirement.

To earn the Biotechnology Laboratory Methods Certificate, a student must be accepted into the Biotechnology program, complete all coursework as prescribed and maintain a 2.0 grade point average.

FOR MORE INFORMATION, VISIT

DMACC.EDU/PROGRAMS/BIOTECHNOLOGY

Julie González, Program Chair/Biology Professor
jegonzalez2@dmacc.edu or 515-964-6379

BIOTECH.DMACC.EDU

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Associate of Science Degree (A.S.)– Biotechnology Concentration

Best option for students who plan to **transfer** or **start a career** in biotech after graduation.

Planning to Transfer?

- As a stand-alone degree, the Associate of Science Degree (A.S.)—Biotechnology Concentration is designed for students who have previous coursework or experience equivalent to the core Liberal Arts Associate in Science degree in biology and chemistry.
- Hands-on lab experience qualifies students to work in research laboratories at their transfer institution.

Planning to start a career in biotech?

- Laboratory technicians may work in the areas of laboratory research, product development, quality control, manufacturing, and testing, and have the option to continue your education at any time.
- Specific career opportunities could require skills related to genetic engineering of plants or microorganisms, gene therapy to correct health problems, DNA fingerprinting, laboratory sample preparation and testing, vaccine development, or production of food, drugs, and other consumer products.

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DMACC DES MOINES AREA COMMUNITY COLLEGE Life's Calling™

Associate of Science Degree—Biotechnology Concentration

Includes Biotechnology Laboratory Methods Certificate

Entry Requirements for the Certificate with AS Degree

1: Complete an application for admission for the AS degree with a Biotechnology concentration

2: Satisfy DMACC assessment requirements.

3: Attend information/registration session and/or arrange a time to meet with program chair.

4: Strongly recommended prerequisites to enable successful program course progression.

- ▶ One year of high school chemistry or successful completion of CHM 122.
- ▶ Two years of high school algebra or MAT 063 and MAT 073.

COURSE REQUIREMENTS

SEMESTER 1

SDV 108	The College Experience.	Credits: 1
ENG 105	Composition I	Credits: 3
BIO 104.	Introductory Biology w/lab (can be substituted with other core science into level courses)	Credits: 3
AS Core Humanities Course		Credits: 3
AS Core Social and Behavioral Science Course		Credits: 3

SEMESTER 2

BIO 112	General Biology I	Credits: 4
ENG 106.	Composition II	Credits: 3
CHM 165	General/Inorganic Chemistry I	Credits: 4
AS Core Social and Behavioral Science Course		Credits: 3

SEMESTER 3

MAT 157.	*Statistics	Credits: 4
BIO 186	*Microbiology	Credits: 4

SEMESTER 4

BIO 113	General Biology II	Credits: 4
BIO 146	Genetics	Credits: 3
CHM 175	General/Inorganic Chemistry II	Credits: 4

Option 1—Select 3 Credits

SPC 101	Fund of Oral Communication	Credits: 3
SPC 126.	Interpersonal & Small Group Communication	Credits: 3

SEMESTER 5

BIO 249	.Biotechnology Internship.	Credits: 2–3
BIO 250	*Cell & Molecular Biology-Nucleic Acids	Credits: 5
BIO 251	*Cell & Molecular Biology-Proteins	Credits: 5
ENG 108	Comp II: Technical Writing	Credits: 3

*Indicates courses included in the Biotechnology Certificate, see Certificate Entry Requirements for the certificate only option.

TOTAL CREDITS REQUIRED TO COMPLETE THIS AS DEGREE 64

Biotechnology Laboratory Methods Certificate

Already have a science degree or equivalent experience?

As a stand-alone degree, the Biotechnology Laboratory Methods Certificate is designed for students who have previous coursework or experience equivalent to the core Liberal Arts Associate in Science degree in biology and chemistry.

The stand-alone certificate allows you to quickly obtain additional laboratory training and update your current skills in order to broaden your job position or to obtain employment in one of the many biotechnology fields. The certificate includes more than 200 hours of hands-on lab experience providing you with the latest information and skills needed to function in a rapidly expanding field that spans many different disciplines, including agriculture, environmental testing and monitoring, medical diagnostic tests and treatments, industrial product development and production, and criminal investigation.

Entry Requirements for the Biotechnology Laboratory Methods Certificate

1. Complete an application for admission to the Biotechnology Program.

2. Previous coursework or experience equivalent to course prerequisites. Contact program chair to verify experience.

COURSE REQUIREMENTS

Students develop understanding and proficiency in a wide variety of methods including:

Nucleic Acids

- Laboratory Safety*
- Good Laboratory Practices*
- Laboratory Notebooks & Documentation*
- Pipetting Skills*
- Solution Preparation*
- Plant Tissue Culture
- Restriction Digestion Analysis
- Conventional PCR & qPCR
- Agarose Gel Electrophoresis
- gDNA Extraction
- GMO Food Testing
- Gene Cloning
- Nested PCR
- PCR Product Purification
- Ligation into Plasmid Vectors
- Clone Sequence Analysis
- Southern Blotting

Protein Chemistry

- Top Five from Nucleic Acids
- Product Quality & GMPs
- Risk Assessment
- Computer Modeling of Protein
- Chromatography Methods
  - o Size Exclusion
  - o Affinity
  - o Ion Exchange
- Polyacrylamide Gel Electrophoresis
- Protein Expression & Purification
- Analysis of Extracted Protein
  - o SDS-PAGE
  - o Concentration
  - o Enzyme Activity
- ELISA and Automation
- Western Blotting
- 2-D PAGE

Microbiology

- Oil Immersion Microscopy
- Aseptic Transfers & Inoculation
- Wet Mount and Hanging Drop Preparations
- Staining Techniques
- Simple, Negative, Gram, Acid-Fast
- Capsule, Endospore, Flagella
- Isolation Methods
- Selective Media Analysis
- Metabolic Analysis
- Identification of Unknowns
- Antimicrobial Susceptibility
- Plaque Assay and Analysis
- Total Coliform Determination

*Top 5 skills from the Nucleic Acid list when referring to them in the protein Chemistry column.

SEMESTER 0

Previous coursework or experience equivalent to course prerequisites. Contact program chair to verify experience.

SEMESTER 1

MAT 157	Statistics	Credits: 4
BIO 186	Microbiology	Credits: 4
BIO 250.	Cell & Molecular Biology-Nucleic Acids	Credits: 5
BIO 251	Cell & Molecular Biology-Proteins	Credits: 5

TOTAL CREDITS REQUIRED TO COMPLETE THIS AS DEGREE 18