



Biotechnology

Biotechnology Laboratory Methods Certificate

What is a Specialist Certificate?

It is a short-term program intended to provide you with the latest information and skills needed to function more effectively in your job or to update your skills for employment possibilities. It will provide you and an employer with evidence of your continued education in a specific occupational area. The education you gain will increase your ability to function in a given area and broaden your skills.

The Biotechnology Laboratory Methods certificate is designed for students who currently have previous coursework or experience equivalent to the core biotechnology AAS or AS program courses in biology and chemistry to quickly obtain additional laboratory training and update their current skills in order to broaden their job position or to obtain employment in biotechnology. The certificate includes the Biotechnology Program capstone courses BIO 250—Cell & Molecular Bio-Nucleic Acids; BIO 251—Cell & Molecular Bio-Proteins and Microbiology to provide them with more than 200 hours of hands-on lab experience, as well as Statistics to ensure that graduates are able to interpret scientific data.

Students start Fall or Spring semester.

Program Entry Requirements

1. Complete an application for admission to the Biotechnology Program.
2. Satisfy the assessment requirement.
3. Attend any required information/registration session.
4. Must submit proof of one year of high school chemistry or Academic Achievement Chemistry I & II or successful completion of CHM 122.
5. Must submit proof of two years of high school algebra or MAT 063 & MAT 073.
6. Demonstrate satisfactory writing skills on college entrance or assessment exam.

biotech.dmacc.edu
800-362 2127

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Program Entry Requirements

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

The certificate coursework is structured to allow students to develop marketable job skills, focusing on written and oral communications, critical thinking, problem solving, computer skills and small-group collaboration. The hands-on laboratory work enables students to develop understanding and proficiency in the following wide variety of biotechnology laboratory methods:

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
STR Analysis
gDNA Extraction
GMO Food Testing
Gene Cloning
Nested PCR
PCR Product Purification
Ligation into Plasmid Vectors
Clone Sequence Analysis
Bioinformatics
Southern Blotting

Protein Chemistry

Top Five Skills from Nucleic Acids List
Understand Product Quality and GMP's
Computer Modeling of Protein Structures
Measure Total Protein in Food Samples
Measure Enzyme Activity
Test Effects of Concentrations,
pH & Temperature on Enzymes
Chromatography Methods
Size Exclusion
Affinity
Ion Exchange
Polyacrylamide Gel Electrophoresis
Protein Extraction & Purification
Analysis of Extracted Protein
SDS-PAGE
Concentration
Enzyme Activity
ELISA and Automation of ELISAs
Western Blotting
2-D PAGE

Microbiology

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

**Top 5 skills from the Nucleic Acid list when referring to them in the Protein Chemistry*

Graduation Requirements

To earn a 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.

Requirements for the Biotechnology Laboratory Methods Certificate

SEMESTER 0

- ▶ BIO 112.....General Biology I..... Credits: 4
- ▶ BIO 113.....General Biology II..... Credits: 4
- ▶ BIO 146.....Genetics Credits: 3

Choose either Option 1 or Option 2 courses.

Must have completed both courses in the option.

Option 1

- ▶ CHM 122*.....Intro to General Chemistry..... Credits: 4
- ▶ CHM 132*.....Intro to Organic/Biochemistry Credits: 4

Option 2

- ▶ CHM 165.....General/Inorganic Chemistry I..... Credits: 4
- ▶ CHM 175.....General/Inorganic Chemistry II..... Credits: 4

SEMESTER 1

- ▶ MAT 157.....Statistics..... Credits: 4
- ▶ BIO 186.....Microbiology Credits: 4

SEMESTER 2

- ▶ BIO 250.....Cell & Molecular Biology—
Nucleic Acids..... Credits: 5
- ▶ BIO 251.....Cell & Molecular Biology—
Proteins..... Credits: 5

TOTAL CREDITS REQUIRED TO COMPLETE THIS CERTIFICATE 18

To complete this program, you must meet the Diversity Requirement with a grade of "C" or higher. See the website for more information about which courses can count toward this requirement.

*Students planning to transfer to a four-year program after completion of this degree should take CHM 165 & 175 instead of CHM 122 & 132.

**For more information, contact
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