

VIRGINIA WESTERN COMMUNITY COLLEGE
OFFICE OF DUAL ENROLLMENT
REGIONAL ACADEMY
SCIENCE– BIOTECHNOLOGY
2024-2025

Monday – Friday

8:00 – 10:45 (refer to class schedule in SIS for actual times)

Two-Year Program designed for Juniors and Seniors in high school

**Refer to the VWCC Website for current tuition rates in effect at time of enrollment.*

Purpose: This curriculum is designed for individuals who seek additional skills to gain employment in the fields of Biotechnology, Health Sciences, and Scientific Research.

Program Objectives: Coursework in this program will provide students with exposure to entry and advanced level skills that may lead to employment in fields related to biotechnology, health sciences, and scientific research. Students will gain an understanding of essential laboratory techniques including utilizing standard operating procedures and quality control methods, aseptic techniques, and key skills related to nucleic acid and protein analysis.

Program Admission Requirements: High School GPA of 3.0+ and completion of Algebra II with a grade of “C” or higher. High School grade level or equivalent to the 11th year.

NOTE: Students will need to review the College Catalog to determine individual course pre-requisites and/or course requirements for the Science-Biotechnology, A.S. Degree (880-09). Degree progress can be found in the student’s MYVWCC SIS portal.

ACADEMY COURSES*

FIRST SEMESTER

BIO 101- General Biology I (SEAPHAGES) (4 CR)
ITE 152- Introduction to Digital Literacy and Computer Applications (3 CR)
MTH 161-Pre-Calculus I (3 CR) or MTH 245-Statistics I (3 CR)
SDV 101- Orientation to Science (2 CR)

SECOND SEMESTER

BIO 250- Biotechnology Research Methods and Skills (3 CR)
BIO 253- Biotechnology Concepts (3 CR)
BIO 255- Bioinformatics and Computer Applications in Biotechnology (2)

THIRD SEMESTER

CHM 111- College Chemistry I (4 CR)
BIO 252 – Nucleic Acid Methods (4 CR)

FOURTH SEMESTER

BIO 150 - Introductory Microbiology (4 CR)
BIO 251 - Protein Applications in Biotechnology (4 CR)

** The semester course schedule may be altered based on faculty and lab space availability at the college.*

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COURSE DESCRIPTIONS: Refer to the VWCC On-Line College Catalog for Course and Program Descriptions found at: [Virginia Western Community College - Acalog ACMS™](https://www.vwcc.edu/academic/catalog)

This program meets some of the requirements for the Science: Biotechnology, A.S. Degree and the Career Studies Certificate in Biotechnology available through Virginia Western Community College.

Recommended Dual Enrollment Courses that may be offered through area high schools.

- ENG 111, 112
- ENG Literature Class
- HIS 121

Students who have completed the following classes through their high school dual enrollment program should meet with the STEM academic advisor regarding their Academy Program of Study:

- BIO 101/102
- CHM 111/112
- MTH 167
- MTH 245

PROGRAM COURSES

BIO 101 - General Biology I

Focuses on biological processes with a chemical foundation, including macromolecules, cellular structure, metabolism, and genetics in an evolutionary context. Explores the core concepts of evolution; structure and function; information flow, storage and exchange; pathways and transformations of energy and matter; and systems biology. Emphasizes the process of science, interdisciplinary approach, and relevance of biology to society. Part I of a two-course sequence. Assignments require college-level reading fluency, coherent written communication, and basic mathematical skills. This is a Passport and UCGS transfer course.

ITE 152 - Introduction to Digital and Information Literacy and Computer Applications

Develops understanding of digital and information literacy. Introduces basic computer concepts in hardware, software, cyber, cloud, database, and operating systems. Includes hands-on experience developing word processing, spreadsheet and presentation documents. Evaluates the reliability of sources. Covers creating a simple web page. Examines topics such as social, legal, and ethical issues. This is a UCGS transfer course.

Lecture 3 hours. Total 3 hours per week.

3 credits

MTH 161 - PreCalculus I

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Presents topics in power, polynomial, rational, exponential, and logarithmic functions, and systems of equations and inequalities. Credit will not be awarded for both MTH 161: Precalculus I and MTH 167: Precalculus with Trigonometry or equivalent. This is a Passport and UCGS transfer course.

Lecture 3 hours. Total 3 hours per week.

3 credits

SDV 101 - Orientation To (Specify the Discipline)

Introduces students to the skills which are necessary to achieve their academic goals, to services offered at the college and to the discipline in which they are enrolled. Covers topics such as services at the college including the learning resources center; counseling, and advising; listening, test taking, and study skills; and topical areas which are applicable to their particular discipline.

BIO 250 - Biotechnology Research Methods and Skills

Provides students with knowledge and advanced laboratory skills needed for employment in the biotechnology industry. Focuses on use of basic and specialized lab equipment and techniques such as solution chemistry, cell culture, DNA extraction and analysis, and protein extraction and analysis. Emphasis in on lab safety, documentation, quality control, and use of SOPs.

Lecture 1 hour, Laboratory 6 hours per week. Total 7 hours per week.

Students are expected to have completed BIO 101 or BIO 173. Co-requisite is BIO 253 Biotechnology Concepts must either be taken previously or concurrent with enrollment in this course.

3 credits

BIO 253 - Biotechnology Concepts

Explores the growing field of biotechnology ranging from basic cellular and molecular biology concepts to both basic and advanced laboratory techniques. Emphasizes the application of biotechnology to medicine, agriculture, environmental science, and forensics. Includes discussion of the business, regulatory/legal, ethical, and societal issues of this topic as well as the growing field of bioinformatics.

Lecture 3 hours. Total 3 hours per week.

Prerequisites: BIO 101 or BIO 173, or instructor permission.

3 credits

BIO 255 - Bioinformatics and Computer Applications in Biotechnology

Covers basic computer concepts and Internet skills and uses a software suite, which includes word processing, spreadsheet, database, and presentation software to demonstrate skills as they are applied to biotechnology. Introduces students to basic online tools and resources to retrieve and analyze biological data, such as DNA, RNA, and protein sequences, structures, functions, pathways, and interactions. Includes hands-on sessions to allow students to become familiar with these resources and their navigation and applications.

(2 Cr.) Lecture 2 hours. Total 2 hours per week.

Local

2 credits

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CHM 111 - General Chemistry I

Explores the fundamental laws, theories, and mathematical concepts of chemistry. Designed primarily for science and engineering majors. Requires a strong background in mathematics. Students must earn a grade of C or higher in the lecture portion of the course to earn an overall grade of C or higher. Part I of II. This is a Passport and UCGS transfer course.

Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

Prerequisites: ENG 111 Eligible

4 credits

BIO 252 - Nucleic Acid Methods

Provides students with advanced laboratory skills needed for employment in the biotechnology industry. Focuses on use of basic and specialized lab equipment and techniques such as solution chemistry, cell culture, DNA extraction and analysis, protein extraction and analysis. Emphasizes lab safety, documentation, quality control, and use of SOPs.

Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

4 credit

BIO 150 - Microbiology for Health Science

Focuses on the general characteristics, cellular structure, and metabolism of microorganisms. Emphasizes microbial relationships with individual and community health. Includes impact of microbes on human health and disease, microbial pathogenicity, identifying and managing infectious diseases and controlling microbial growth, healthcare associated infections and epidemiology. Studies aseptic culturing techniques with hands-on experience in safe microbiology practices.

Lecture 3 hours. Recitation and laboratory 3 hours. Total 6 hours per week.

Prerequisite: BIO 101 or BIO 141

4 credits

BIO 251 - Protein Applications in Biotechnology

Prepares students to understand protein structure and function and teaches the laboratory skills needed to successfully work with proteins. Focuses on levels of protein structure and protein function. Includes common laboratory assays will for protein synthesis, purification, detection, and quantification.

Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

4 credits