

Biomedical Science - PLTW





**Office of the State Superintendent of Education
Postsecondary and Career Education Division
Career and Technical Education Department**

**Christina Grant, Ed.D.
State Superintendent of Education**

**Antoinette Mitchell, Ph.D.
Assistant Superintendent, Postsecondary and Career Education**

**Kilin Boardman-Schroyer
Deputy Assistant Superintendent, Postsecondary and Career Education**

**Richard W. Kincaid
State Director, Career and Technical Education**

The purpose of this document is to communicate the required Career and Technical Education (CTE) academic standards for the Biomedical Science (PLTW) Program of Study. The academic standards in this document are theoretical and performance-based. The standards contain content from Colorado, Maryland, Tennessee, and Texas and were validated by D.C. business and industry partners. All content is used with permission.

In addition to academic standards, OSSE has incorporated into this document Labor Market Information (LMI) definitions and explanations for the Program of Study; program aligned Industry Recognized Credentials; and Work-Based Learning resources and requirements by course level.

This document is intended for use by educational administrators and practitioners. A similar document is available for each state-approved CTE Program of Study.



Table of Contents

Course Descriptions: Biomedical Science - PLTW	4
Industry Certifications	4
Work-Based Learning Examples and Resources	5
Labor Market Information Definitions and Data	6
Model Six-Year Plan: Biomedical Sciences - PLTW	7
Course Standards	8
Principles of Biomedical Sciences	8
Human Body Systems	9
Medical Interventions	10
Biomedical Innovation	11



Course Descriptions: Biomedical Science (PLTW)

Course Level	Course Information	Description
Level I	Principles of Biomedical Sciences OSSEID: 03066G1.0014 Grades: 9-12 Prerequisite: None Credit: 1	In the introductory course of the PLTW Biomedical Science program, students explore concepts of biology and medicine to determine factors that led to the death of a fictional person. While investigating the case, students examine autopsy reports, investigate medical history, and explore medical treatments that might have prolonged the person’s life. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes while allowing them to design their own experiments to solve problems.
Level II	Human Body Systems OSSEID: 03067G1.0024 Grades: 10-12 Prerequisite: Principles of Biomedical Sciences Credit: 1	Students examine the interactions of human body systems as they explore identity, power, movement, protection, and homeostasis in the body. Exploring science in action, students build organs and tissues on a skeletal Maniken; use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration; and take on the roles of biomedical professionals to solve real-world medical cases.
Level III	Medical Interventions Practice OSSEID: 03068G1.0034 Grades: 11-12 Prerequisite: Human Body Systems Credit: 1	Students follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options; and prevail when the organs of the body begin to fail. Through real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.
Level IV	Biomedical Innovation OSSEID: 03070G1.0044 Grades: 12 Prerequisite: Biomedical Innovation Credit: 1	In the final course of the PLTW Biomedical Science sequence, students build on the knowledge and skills gained from previous courses to design innovative solutions for the most pressing health challenges of the 21st century. Students address topics ranging from public health and biomedical engineering to clinical medicine and physiology. They have the opportunity to work on an independent project with a mentor or advisor from a university, medical facility, or research institution.

Industry Certifications



Work-Based Learning Examples and Resources

Level I Course	Level II Course	Level III Course	Level IV Course
Career Exploration Industry Visits Guest Speakers Participate in a CTSO	Career Awareness <i>All of Level I, plus:</i> Postsecondary Visits Program- Specific Site Tours Mock Interviews	Career Preparation <i>All of Level I and II, plus:</i> Job Shadow Paid/Unpaid Internships	Career Preparation Paid/Unpaid Internships Apprenticeships

Several resources are available to help instructors meet the Level I and Level II WBL requirements, including:

Career Coach DC (<http://careercoachdc.emsicc.com>). Online site designed to help students find and connect to a career pathway by providing the most current local data on wages, employment, job postings, and associated education and training. The resource includes a Career Assessment for students.

Nepris (<https://dc.nepris.com/>). Connects educators and learners with a network of industry professionals virtually, bringing real-world relevance and career exposure to all students. Nepris also provides a skills-based volunteering platform for business and industry professionals to extend their educational outreach.

Virtual Job Shadow (<https://virtualjobshadow.com>). Provides interactive tools which empower students to discover, plan, and pursue their dreams. Rich video library presents a “day in the life of” view for thousands of occupations.



Labor Market Information Definitions and Data

Career and Technical Education programs of study in the District of Columbia must meet at least one of the High Wage, High Skill, and In-Demand definitions below to be considered appropriate for our students and the regional labor market. These definitions were created in collaboration with Career and Technical Education leaders from District of Columbia LEAs, the University of the District of Columbia Community College, and national guidance from Research Triangle International (RTI) and Education Northwest. Additionally, previous work was consulted by researchers at MIT's Labor Wage Index Project and the DC CTE Task Force's 2012 Strategic Plan for the District of Columbia.

Indicator	Definition	Data for the Biomedical Science - PLTW Program of Study (source: EMSI, August 2022)
<p>High Wage</p>	<p>Those occupations that have a 25th percentile wage equal to or greater than the most recent MIT Living Wage Index for one adult in the District of Columbia, and/or leads to a position that pays at least the median hourly or annual wage for the Washington, DC, metropolitan statistical area.</p> <p><i>Note: A 25th percentile hourly wage of \$23.13 or greater is required to meet this definition.</i></p>	<p>Standard Occupational Code (SOC): 17-2031.00 Bioengineers and Biomedical Engineers</p> <p>Hourly Wages 25th Percentile: \$39.14 50th Percentile: \$50.85 75th Percentile: \$66.51</p>
<p>High Skill</p>	<p>Those occupations located within the Washington, DC, metropolitan statistical area with the following education or training requirements: completion of an apprenticeship program; completion of an industry-recognized certification or credential; associate's degree, or higher.</p>	<p>Typical Entry-Level Education: Bachelor's Degree</p>
<p>In-Demand</p>	<p>Those occupations in the Washington, DC, metropolitan statistical area having more than the median number of total (growth plus replacement) annual openings over a five-year period.</p> <p><i>Note: An occupation is required to have an annual growth plus replacement rate of 105 openings, or greater, between 2020-25 to meet this definition.</i></p>	<p>Annual Openings: 95</p>



Model Six-Year Plan: Biomedical Sciences - PLTW

College: University of the District of Columbia Community College

Program/CIP:

Plan:

Entity: Office of the State Superintendent of Education

Career Cluster: Health Science

Program of Study: Biomedical Science - PLTW

Subject	High School				College			
	9 th Grade	10 th Grade	11 th Grade	12 th Grade	Semester I	Semester II	Semester III	Semester IV
English (4)	English I	English II	English III	English IV				
Math (4)	Algebra I	Geometry	Algebra II	Math				
Science (4)	Biology	Lab Science	Anatomy and Physiology	Science				
Social Studies (4)	World History and Geography I: Middle Ages	World History and Geography II: Modern World	U.S. History	U.S. Government (.5) and D.C. History (.5)				
Health (.5) and Physical Ed (1)	Health (.5) Physical Ed (.5)	Physical Ed (.5)						
World Languages (2)			World Language I	World Language II				
Art (.5)		Art (.5)						
Music (.5)		Music (.5)						
Elective / Major Courses	Principles of Biomedical Science	Human Body Systems Science	Medical Interventions Science	Biomedical Innovation Science				
Total possible college credits completed in high school: XX					Credit hours required to complete the AAS program: XX			



Course Standards

Principles of Biomedical Sciences

1. **General requirements.** This course is recommended for students in Grades 9-12. Recommended prerequisite: none. Students shall be awarded one credit for successful completion of this course.
2. **Introduction.**
 - A. Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - B. The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.
 - C. In the introductory course of the PLTW Biomedical Science program, students explore concepts of biology and medicine to determine factors that led to the death of a fictional person. While investigating the case, students examine autopsy reports, investigate medical history, and explore medical treatments that might have prolonged the person's life. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes while allowing them to design their own experiments to solve problems.
 - D. Students will participate in at least two Career Exploration Work-Based Learning experiences in this course, which might include guest speakers and work-place tours relevant to the program of study.
 - E. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
3. **Knowledge and Skills.** Content requirements for Project Lead the Way Principles of Biomedical Sciences are prescribed in the Project Lead the Way publication: Principles of Biomedical Sciences, published by Project Lead the Way.



Human Body Systems

1. **General requirements.** This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Biomedical Sciences. Students shall be awarded one credit for successful completion of this course.
2. **Introduction.**
 - A. Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - B. The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.
 - C. Students examine the interactions of human body systems as they explore identity, power, movement, protection, and homeostasis in the body. Exploring science in action, students build organs and tissues on a skeletal Manikin; use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration, and take on the roles of biomedical professionals to solve real-world medical cases.
 - D. Students will participate in a Career Preparation Work-Based Learning experience in this course, which includes paid or unpaid internship, pre-apprenticeship, or apprenticeship experiences relevant to the program of study.
 - E. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
3. **Knowledge and Skills.** Content requirements for Project Lead the Way Human Body Systems are prescribed in the Project Lead the Way publication: Human Body Systems, published by Project Lead the Way.



Medical Interventions

1. **General requirements.** This course is recommended for students in Grades 11-12. Recommended prerequisite: Human Body Systems. Students shall be awarded one credit for successful completion of this course.
2. **Introduction.**
 - A. Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - B. The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.
 - C. Students follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options, and prevail when the organs of the body begin to fail. Through real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.
 - D. Students will participate in a Career Preparation Work-Based Learning experience in this course, which might include paid or unpaid internship experiences relevant to the program of study.
 - E. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
3. **Knowledge and Skills.** Content requirements for Project Lead the Way Medical Interventions are prescribed in the Project Lead the Way publication: Medical Interventions, published by Project Lead the Way.



Biomedical Innovation

1. **General requirements.** This course is recommended for students in Grades 11-12. Recommended prerequisite: Medical Interventions. Students shall be awarded one credit for successful completion of this course.
2. **Introduction.**
 - A. Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - B. The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.
 - C. Students follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options, and prevail when the organs of the body begin to fail. Through real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.
 - D. Students will participate in a Career Preparation Work-Based Learning experience in this course, which might include paid or unpaid internship experiences relevant to the program of study.
 - E. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
4. **Knowledge and Skills.** Content requirements for Project Lead the Way Biomedical Innovation are prescribed in the Project Lead the Way publication: Biomedical Innovation, published by Project Lead the Way.