Maryland CTE Programs of Study

Biomedical Science II (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 10-12, and Biomedical Science I is the prerequisite. 1

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INTRODUCTION 2

A **Career and Technical Education (CTE) 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.** 2.A

B **The Health and Human Services Career Cluster promotes whole health in individuals and communities through diverse services. This sector includes technical, mental, and therapeutic services and personal care supported by medical and social sciences. By addressing social determinants of health and leveraging health data and science, this Cluster aims to enhance the overall health and resilience of individuals, families, and communities.** 2.B

C **The Biomedical Science Program of Study immerses students in scientific principles, laboratory techniques, clinical practices, and professional skills essential for success in today's healthcare and biotechnology fields. Throughout the program, students learn to address complex biomedical challenges, incorporate ethical and regulatory considerations, and remain adaptable to rapidly evolving technologies and healthcare demands. By completing the Biomedical Science program, graduates are well-prepared to advance into higher education, seek industry-recognized credentials, and contribute to developing innovative medical treatments, pharmaceuticals, devices, and solutions that enhance individuals', families', and communities' health and resilience.** 2.C

D **Biomedical Science II advances students' exploration of the human body and healthcare innovation by building on the foundational skills and knowledge acquired in earlier coursework. In this course, students delve deeper into human anatomy and physiology at a level aligned with introductory college standards, examining each major body system to understand normal functioning and disease states. They refine laboratory techniques—such as micropipetting and DNA gel electrophoresis—and apply specialized assessments, including EMG and spirometry, to investigate physiological processes and interpret clinical data. Students strengthen their scientific reasoning and problem-solving abilities by integrating cutting-edge research tools, analytical software, and professional**

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communication strategies. They learn to design controlled experiments, accurately analyze results, and clearly present findings. This course prepares students for dual credit coursework, industry-recognized certifications like the BACE exam, and work-based learning experiences such as internships or apprenticeships. 2.D

E **Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.** 2.E

F **Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.** 2.F

KNOWLEDGE AND SKILLS 3

A **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:** 3.A

1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work. 3.A.1
2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn. 3.A.2
3. Employ effective reading, writing, and technical documentation skills. 3.A.3
4. Solve problems using critical thinking techniques and structured troubleshooting methodologies. 3.A.4
5. Demonstrate leadership skills and collaborate effectively as a team member. 3.A.5
6. Implement safety procedures, including proper use of software and following privacy guidelines. 3.A.6
7. Exhibit an understanding of legal and ethical responsibilities in the biomedical science field, following copyright laws and regulations. 3.A.7
8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting. 3.A.8

B **The student identifies various career pathways in the biomedical science field. The student is expected to:** 3.B

1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in healthcare. 3.B.1
2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations. 3.B.2
3. Demonstrate effective interview skills for roles in healthcare fields. 3.B.3

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C **The student develops technology and digital literacy skills. The student is expected to:** 3.C

1 Use technology as a tool for research, organization, communication, and problem-solving. 3.C.1

2 Use digital tools, including computers, mobile devices, collaboration platforms, and cloud services, to access, manage, and create information. 3.C.2

3 Demonstrate proficiency in using emerging and industry-standard technologies. 3.C.3

4 Understand ethical and legal considerations for technology use, including the principles of data protection, copyright, and responsible technology use. 3.C.4

D The student integrates core academic skills into biomedical science practices. The student is expected to: 3.D

1 Demonstrate the use of clear communication techniques, both written and verbal, that are consistent with industry standards. 3.D.1

2 Apply English concepts such as writing informative texts when documenting procedures and articulating goals. 3.D.2

3 Use mathematical concepts for measurement and conversion (Fahrenheit vs. Celsius), ratios and proportions as well as fraction and decimal conversions. 3.D.3

E The student demonstrates the necessary skills to conduct physiological assessments that inform understanding of human body systems. The student is expected to: 3.E

1 Perform EMG and spirometry measurements to assess muscular and respiratory function. 3.E.1

2 Use visual perception testing, urinalysis, and the ankle-brachial index to identify potential physiological abnormalities. 3.E.2

3 Relate collected data to normal and abnormal body system functions. 3.E.3

F The student demonstrates knowledge of human anatomy and physiology at a level reflecting introductory college coursework. The student is expected to: 3.F

1 Identify major structures of the body's organ systems and explain their primary functions. 3.F.1

2 Describe how cells, tissues, and organs interact to maintain homeostasis. 3.F.2

3 Compare normal and diseased states, citing examples of how structural or functional changes impact overall health. 3.F.3

G The student demonstrates proficiency in the use of equipment, software, and tools essential to biomedical research. The student is expected to: 3.G

1 Employ microscopes and goniometers to observe tissue samples and measure joint angles. 3.G.1

2 Utilize Vernier probes, sensors, and Logger Pro software to collect and analyze physiological data. 3.G.2

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3 Use Microsoft Office tools to organize, present, and report scientific findings. 3.G.3

H **The student demonstrates the ability to design and execute scientific experiments following best practices. The student is expected to:** 3.H

1. Formulate testable hypotheses and identify independent and dependent variables. 3.H.1
2. Apply appropriate controls, replicate trials, and ensure sufficient sample size for reliable data. 3.H.2
3. Construct graphs and use basic statistical methods to interpret and present results. 3.H.3

I **The student demonstrates critical thinking and problem-solving skills to adapt experimental methods. The student is expected to:** 3.I

1. Troubleshoot laboratory protocols when unexpected results occur. 3.I.1
2. Adjust experimental designs to improve data accuracy or relevance. 3.I.2
3. Consult scientific literature to inspire solutions or refine techniques. 3.I.3

J **The student demonstrates the ability to interpret clinical data and connect it to patient health outcomes. The student is expected to:** 3.J

1. Analyze results from blood typing, EMG, spirometry, and other clinical tests to identify potential health conditions. 3.J.1
2. Relate data-driven findings to diagnostic criteria and possible treatment options. 3.J.2
3. Consider how social determinants of health influence patient risk factors and outcomes. 3.J.3

K **The student demonstrates familiarity with emerging biomedical technologies and their ethical implications. The student is expected to:** 3.K

1. Investigate recent advances in regenerative medicine, gene therapy, or advanced imaging techniques. 3.K.1
2. Evaluate potential benefits and risks of new technologies for patients and communities. 3.K.2
3. Discuss basic ethical, legal, and social considerations related to biomedical innovation. 3.K.3

L **The student demonstrates professional skills that foster success in healthcare and research environments. The student is expected to:** 3.L

1. Work collaboratively in teams, sharing tasks and responsibilities fairly. 3.L.1
2. Communicate findings clearly and professionally, both verbally and in writing. 3.L.2
3. Manage time effectively to meet project deadlines and maintain laboratory productivity. 3.L.3

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The student demonstrates readiness for postsecondary opportunities and workplace experiences in biomedical science fields. The student is expected

to: 3.M

1. Seek dual credit or other advanced academic courses to prepare for college-level studies. 3.M.1
2. Investigate opportunities for internships, apprenticeships, or job shadowing to gain practical experience. 3.M.2
3. Build a professional portfolio highlighting technical, analytical, and communication skills. 3.M.3