Texas CTE

Principles of Health Science

General requirements. This course is recommended for students in Grades 10-12. Prerequisites: Biology and Chemistry. Recommended prerequisite: a course from the Health Science Career Cluster. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course. MM.A

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Introduction. MM.B

1 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. MM.B1

2 The Health Science Career Cluster focuses on planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development. MM.B2

3 The Medical Microbiology course is designed to explore the microbial world, studying topics such as pathogenic and non-pathogenic microorganisms, laboratory procedures, identifying microorganisms, drug resistant organisms, and emerging diseases. MM.B3

4 **Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.** MM.B4

5 **Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.** MM.B5

6 **Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).** MM.B6

7 **A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.** MM.B7

8 **Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.** MM.B8

9 **Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.** MM.B9

Knowledge and skills. MM.C

1 **The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:** MM.C1

A demonstrate verbal and non-verbal communication in a clear, concise, and effective manner; and MM.C1.A

C exhibit the ability to cooperate, contribute, and collaborate as a member of a team. MM.C1.B

2 **The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:** MM.C2

A demonstrate safe practices during laboratory and field investigations; and MM.C2.A

B demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. MM.C2.B

3 **The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:** MM.C3

A know the definition of science and understand that it has limitations, as specified in subsection (b)(4) of this section; MM.C3.A

B know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; MM.C3.B

C know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science are created and new technologies emerge; MM.C3.C

D distinguish between scientific hypothesis and scientific theories; MM.C3.D

E plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology; MM.C3.E

F collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures; MM.C3.F

G analyze, evaluate, make inferences, and predict trends from data; MM.C3.G

H communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports; MM.C3.H

I dispose of all biological material in the proper biohazard containers; and MM.C3.I

J employ standard precautions, including proper protective equipment during all laboratory exercises. MM.C3.J

4 **The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:** MM.C4

- A in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking MM.C4.A
- B communicate and apply scientific information extracted from various sources such as accredited scientific journals, institutions of higher learning, current events, news reports, published journal articles, and marketing materials; MM.C4.B
- C draw inferences based on data related to promotional materials for products and services; MM.C4.C
- D evaluate the impact of scientific research on society and the environment; MM.C4.D
- E evaluate models according to their limitations in representing biological objects or events; and MM.C4.E
- F research and describe the history of science and contributions of scientists. MM.C4.F

5 **The student describes the relationships between microorganisms and health and wellness in the human body. The student is expected to:** MM.C5

- A research and describe the historical development of microbiology as it relates to health care of an individual; and MM.C5.A
- B research roles, functions, and responsibilities of agencies governing infectious disease control. MM.C5.B

6 **The student is expected to perform and analyze results in the microbiology laboratory. The student is expected to:** MM.C6

- A classify microorganisms using a dichotomous key; MM.C6.A
- B explain the difference between Gram positive and Gram negative bacteria regarding the bacterial cell wall; MM.C6.B
- C identify chemical processes of microorganisms; MM.C6.C
- D recognize the factors required for microbial reproduction and growth; MM.C6.D
- E identify the normal flora microorganisms of the human body; MM.C6.E
- F distinguish between pathogens, opportunistic pathogens, hospital-acquired infections, and colonizing microorganisms; MM.C6.F
- G describe the colony morphology of microorganisms; MM.C6.G
- H interpret Gram stain results; MM.C6.H
- I discuss the results of laboratory procedures such as biochemical reactions that are used to identify microorganisms; and MM.C6.I
- J explain the role of the sensitivity report provided to the clinician by the microbiology department. MM.C6.J

7 The student examines the role of microorganisms in infectious diseases. The student is expected to: MM.C7

A outline the infectious process, including how pathogenic microorganisms affect human body systems; MM.C7.A

B categorize diseases caused by bacteria, fungi, viruses, protozoa, rickettsias, arthropods, and helminths; MM.C7.B

C explain the body's immune response and defenses against infection; MM.C7.C

D evaluate the effects of anti-microbial agents such as narrow and broad spectrum antibiotics; MM.C7.D

E examine reemergence of diseases such as malaria, tuberculosis, and polio; MM.C7.E

F identify common bacterial infections from hospital-acquired infection and community-acquired infections such as Clostridium difficile and Staphylococcus aureus; MM.C7.F

G investigate drug-resistant microorganisms such as carbapenem-resistant Enterobacteriaceae, methicillin-resistant Staphylococcus aureus, vancomycin-intermediate/resistant Staphylococci aureus, vancomycin-resistant enterococci, and emergent antibiotic-resistant superbugs; and MM.C7.G

H outline the role of the governing agencies in monitoring and establishing guidelines based on the spread of infectious diseases. MM.C7.H