

# Pathophysiology

Subject: Career Development and Career and Technical Education

Grade: 11

Expectations: 42

Breakouts: 189

## (a) Introduction.

1. Career and technical education instruction provides content aligned with challenging academic standards, industry-relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.
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.
3. The Pathophysiology course is designed for students to conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Pathophysiology will study disease processes and how humans are affected. Emphasis is placed on prevention and treatment of disease.
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 currently scientifically testable.
5. Students are expected to know that:
  - a. 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; and
  - b. scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike h



- (v) apply scientific practices to conduct comparative investigations
  - (vi) apply scientific practices to conduct experimental investigations
  - (vii) use engineering practices to design solutions to problems
- (C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;
- (i) use appropriate safety equipment during laboratory investigations as outlined in Texas Education Agency-approved safety standards
  - (ii) use appropriate safety equipment during classroom investigations as outlined in Texas Education Agency-approved safety standards
  - (iii) use appropriate safety equipment during field investigations as outlined in Texas Education Agency-approved safety standards
  - (iv) use appropriate safety practices during laboratory investigations as outlined in Texas Education Agency-approved safety standards
  - (v) use appropriate safety practices during classroom investigations as outlined in Texas Education Agency-approved safety standards
  - (vi) use appropriate safety practices during field investigations as outlined in Texas Education Agency-approved safety standards
- (D) use appropriate tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatus, and other appropriate devices.

- (ix) organize qualitative data using lab notebooks or journals
  - (x) organize qualitative data using lab reports
  - (xi) organize qualitative using labeled drawings
  - (xii) organize qualitative using graphic organizers
  - (xiii) organize qualitative using peer reviewed medical journals
  - (xiv) organize qualitative using summaries
  - (xv) organize qualitative using oral reports
  - (xvi) organize qualitative using technology-based reports
- (G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and
- (i) develop models to represent phenomena, systems, processes, or solutions to engineering problems
  - (ii) use models to represent phenomena, systems, processes, or solutions to engineering problems
- (H) distinguish between scientific hypotheses, theories, and laws.
- (i) distinguish between scientific hypotheses, theories, and laws
- (3) The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:
- (A) identify advantages and limitations of models such as their size, scale, properties, and materials;
- (i) identify advantages of models
  - (ii) identify limitations of models
- (B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;
- (i) analyze data by identifying significant statistical features
  - (ii) analyze data by identifying patterns
  - (iii) analyze data by identifying sources of error
  - (iv) analyze data by identifying limitations
- (C) use mathematical calculations to assess quantitative relationships in data; and
- (i) use mathematical calculations to assess quantitative relationships in data
- (D) evaluate experimental and engineering designs.
- (i) evaluate experimental designs
  - (ii) evaluate engineering designs
- (4) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:
- (A) develop explanations and propose solutions supported by data and mode

(iii)

(vi)

(xvi) relate the impact of current research on society including contributions of diverse engineers as related to the content

(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) or health science field in order to investigate careers.

(i) research STEM careers

(ii) explore resources in order to investigate STEM careers

(6) The student analyzes the mechanisms of pathology. The student is expected to:

(A) describe abnormal biological and chemical processes at the cellular level;

(i) describe abnormal biological processes at the cellular level

(ii) describe abnormal chemical processes at the cellular level

(B) examine and analyze changes resulting from mutations and neoplasms by examining cells, tissues, organs, and systems;

(i) examine changes resulting from mutations by examining cells

(ii) examine changes resulting from mutations by examining tissues

(iii) examine changes resulting from mutations by examining organs and systems

- (v) investigate factors that contribute to disease, including heredity
- (D) analyze and describe how the body's compensating mechanisms attempt to maintain homeostasis when changes occur.
  - (i) analyze how the body's compensating mechanisms attempt to maintain homeostasis when changes occur
  - (ii) describe how the body's compensating mechanisms attempt to maintain homeostasis when changes occur
- (7) The student examines the process of pathogenesis. The student is expected to:
  - (A) differentiate and identify pathogenic organisms using microbiological techniques such as gram staining, biochemical identification, and microscopic observation;
    - (i) differentiate pathogenic organisms using microbiological techniques
    - (ii) identify pathogenic organisms using microbiological techniques
  - (B) research and summarize the stages of pathogenesis, including incubation period, prodromal period, and exacerbation or remission;
    - (i) research the stages of pathogenesis, including incubation period
    - (ii) research the stages of pathogenesis, including prodromal period
    - (iii) research the stages of pathogenesis, including exacerbation or remission
    - (iv) summarize the stages of pathogenesis, including incubation period
    - (v) summarize the stages of pathogenesis, including prodromal period
    - (vi) summarize the stages of pathogenesis, including exacerbation or remission
  - (C) analyze the body's natural defense systems against infection, including barriers, the inflammatory response, and the immune response;
    - (i) analyze the body's natural defense systems against infection, including barriers
    - (ii) analyze the body's natural defense systems against infection, including the inflammatory response
    - (iii) analyze the body's natural defense systems against infection, including the immune response
  - (D) analyze other mechanisms of disease prevention and treatment such as vaccinations, antibiotics, chemotherapy, and immunotherapy; and
    - (i) analyze other mechanisms of disease prevention
    - (ii) analyze other mechanisms of disease treatment
  - (E)



- (ii) investigate the signs of diseases
  - (iii) investigate the symptoms of diseases
  - (iv) investigate the diagnosis of diseases
  - (v) investigate the prognosis of diseases
  - (vi) investigate the treatment of diseases
- (B) explore and describe advanced technologies for the diagnosis and treatment of disease;
- (i) explore advanced technologies for the diagnosis of disease
  - (ii) explore advanced technologies for the treatment of disease
  - (iii) describe advanced technologies for the diagnosis of disease
  - (iv) describe advanced technologies for the treatment of disease
- (C) research and describe reemergence of diseases such as malaria, tuberculosis, polio, and measles;
- (i) research reemergence of diseases
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- (ii) evaluate public health issues related to isolation
  - (iii) evaluate public health issues related to immunization
  - (iv) evaluate public health issues related to quarantine
- (B) analyze the effects of stress and aging on the body;
- (i) analyze the effects of stress on the body
  - (ii) analyze the effects of aging on the body
- (C) analyze patient medical data and interpret medical laboratory test results to inform diagnosis and treatment;
- (i) analyze patient medical data to inform diagnosis
  - (ii) analyze patient medical data to inform treatment
  - (iii) interpret medical laboratory test results to inform diagnosis
  - (iv) interpret medical laboratory test results to inform treatment
- (Dt