

Course of Study

Anatomy & Physiology

Warren County Career Center

**3525 North State Route 48
Lebanon, Ohio 45036**

Adopted 6-15-06

*This document is for the use of the staff at Warren County Career Center.
Credit is given the designer of the template, Upper Valley JVS, Piqua, Ohio.*

Table of Contents

| | |
|--|-----------|
| Acknowledgements | 3 |
| School Board Approval | 4 |
| Statement of Recommendation | 5 |
| Warren County Career Center Vision and Mission Statements and Values..... | 6 |
| Course Design..... | 7 |
| Course Philosophy | 7 |
| Course Goals..... | 8 |
| Course Description..... | 9 |
| Academic and Technical Integration | 10 |
| Technology | 10 |
| Students Served..... | 11 |
| Scope and Sequence | 12 |
| Technology Standards..... | 16 |
| Performance Measures/Student Assessments/Instructional Strategies..... | 19 |

Acknowledgements

Anatomy & Physiology Warren County Career Center

We would like to take this opportunity to express our gratitude to the following people for their guidance and support in the preparation of this course of study:

Warren County Career Center Administrative Team
Warren County Educational Service Center
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Statement of Recommendation

The Science Department at Warren County Career Center has reviewed this course of study and recommends it for use as the foundation for instruction in the Anatomy & Physiology class.

The developers of this course of study have considered local labor market needs and the school's ability to offer specialized programs. The competencies have been reviewed and accepted as being congruent with our school's vision, mission, and strategic goals. When appropriate, additional competencies related to the program area have been incorporated into this course of study.

Achievement of technical competencies, utilizing proper attitudes, and demonstrating appropriate values are critical for successful employment and for furthering educational opportunities within a student's chosen field. We believe that this course of study adequately and correctly focuses upon student development.

This course of study is recommended on: 6-15-06

Warren County Career Center Vision Statement

WCCC is the valued partner of choice within the educational and economic systems of our communities, by providing quality academic and career technical education.

We pave the way for a future of opportunities unique to each of our learners.

Warren County Career Center Mission Statement

To prepare youths and adults to make informed career choices and to successfully enter, compete, and advance in a changing work world.

Warren County Career Values

- Communicating openly and honestly
- Taking ownership of personal actions and being held accountable for results
- Upholding and demonstrating high ethical, educational and fiscal standards
- Exhibiting high levels of professionalism
- Providing high quality instruction and highly qualified staff to ensure success for all learners
- Making quality customer service a high priority
- Promoting partnerships and a team environment
- Celebrating team and individual achievements
- Using data to drive planning, decision making and actions

Course Design

Courses are designed to reflect career-focused education, which combines high-level academics with real-life technical skills. The intent is to maximize a student's present and future academic and career success.

Career-focused education enhances the integration of academic and technical skills, designs programs that prepare students with transferable skills and promotes each student's career opportunities.

Course Philosophy

We believe that the philosophy for our science courses to be:

- Prepare students to use appropriate scientific processes and principles to make personal decisions;
- Enable students to engage in intelligent public discourse about matters of scientific and technological concern;
- Help students develop an understanding of themselves and the world in which they live;
- Foster an understanding of the nature of science, the development of science processes, the principles of science, and the connections between all the sciences;
- Increase their future economic productivity through the use of scientific knowledge, understanding, and skills in their careers.

Course Goals

The course goals for Anatomy & Physiology are to:

Set high expectations and provide support for achievement by all students

- Provide balance among conceptual understanding, procedural knowledge and skills, and application and problem-solving
- Provide skills to allow them to be able to apply scientific knowledge and processes to individual and societal issues
- Incorporate the use of technology by all students and the interconnected nature of science and technology
- Understand the structure and function of the human body, the interdependence of these systems and their interaction with the physical environment surrounding these systems

Course Description

This course follows the curriculum of the Human Biology 103 course taught at Sinclair Community College.

Anatomy/physiology is designed to give the student a comprehensive study of all body system structures and their function.

This in depth look at these systems will develop the skills necessary for a successful career in health care or the ability to succeed in college coursework in this area.

Academic and Technical Integration

Expectations of curriculum must be aligned with what is written, taught, assessed, and reported. Student expectations focus on active, project-centered learning—an approach to learning that emphasizes a connection between ideas in a discipline and the outside world. Educational programming and course content will clearly connect career and post-secondary opportunities. At the Warren County Career Center, the main goal is to design courses and projects that use strategies for authentic instruction. These characteristics of instruction focus on deep understanding, established opportunities for concept connections, provide anticipatory and abstract thinking, and emphasize genuine application.

The academic courses at the WCCC follow the state model curricula. They are designed to meet both associate school and state requirements. These standards respond to the need to improve student achievement, quality of curriculum and instruction, and strengthen school and community relationships.

Technology

The Warren County Career Center board and staff believe that technology skills are essential for all students to achieve in the 21st century. It is the goal of this district to infuse technology into all facets of education:

- Instruction
- Assessment
- Administration
- Career planning
- Course design
- Professional development

Strategies to incorporate technology into all facets of education are a priority of the district and there is commitment to a continual process to provide updated hardware, software, and professional development for staff members for the purpose of providing a high quality education, with the integration of technology, for all students.

Students Served

The population served by this program are juniors and seniors at the Warren County Career Center.

Scope and Sequence

Anatomy & Physiology

- Competency 1.1 Location of major structures in the human body
- 1.1.1 Define homeostasis and its importance to survival
 - 1.1.2 Define basic life functions
 - 1.1.3 List major organs located in each major body cavity
 - 1.1.4 Name the membranes associated with the cranial, spinal, thoracic, and abdominopelvic cavities
 - 1.1.5 Describe the functions of the major organ systems
 - 1.1.6 Utilize terms that describe relative body positions, sections, and positions
- Competency 1.2 Cellular mechanisms and metabolism
- 1.2.1 List and describe the major characteristics of life
 - 1.2.2 Describe the life cycle of a cell and its reproduction
 - 1.2.3 Explain protein synthesis within cells
 - 1.2.4 Explain how substances move through cell membranes
 - 1.2.5 Describe a homeostatic mechanism
 - 1.2.6 Explain levels of organization in body
 - 1.2.7 Describe anabolic and catabolic metabolism
 - 1.2.8 Explain cellular respiratory process and its components
 - 1.2.9 Describe how genetic information is stored and accessed
 - 1.2.10 Describe DNA replication
- Competency 1.3 Tissue identification, structure, and function
- 1.3.1 General characteristics of different tissue types
 - 1.3.2 Describe the general characteristics and functions of epithelial tissue
 - 1.3.3 Name the types of epithelium, and identify an organ in which each is found
 - 1.3.4 Identify nervous tissue, epithelial tissue, muscle tissue, and connective tissue
 - 1.3.5 Describe the general characteristics of connective tissue
 - 1.3.6 List the types of connective tissues that occur within the body
 - 1.3.7 Describe the major functions of each type of connective tissue
 - 1.3.8 Distinguish between the three types of muscle tissue
 - 1.3.9 Describe the general characteristics and functions of nervous tissue
- Competency 1.4 The structure of the various skin layers
- 1.4.1 Describe the structure of various skin layers
 - 1.4.2 List the general functions of each layer of skin
 - 1.4.3 Describe the accessory organs associated with the skin
 - 1.4.4 Explain how the skin functions in regulating body temperature
 - 1.4.5 Describe the four major types of membranes

Competency 1.5 Skeletal System structure and function

- 1.5.1 Explain bone function, development, growth, and repair
- 1.5.2 Identify major bones of the human body
- 1.5.3 Describe gross and microscopic anatomy of bone
- 1.5.4 Distinguish between intramembraneous and endochondrial bones
- 1.5.5 Discuss major functions of bone
- 1.5.6 Locate and identify major articulating features of major bones
- 1.5.7 List three major classes of joints and describe characteristics
- 1.5.8 Identify and demonstrate several types of joint movement

Competency 1.6 Muscular system structure and function

- 1.6.1 Name the major parts of a skeletal muscle fiber and describe the functions
- 1.6.2 Explain the series of events that occur in muscle fiber contraction
- 1.6.3 Explain how energy is supplied to the muscle fiber contraction mechanism
- 1.6.4 Describe how connective tissue is included in the structure of a skeletal muscle
- 1.6.5 Describe oxygen debt and muscle fatigue
- 1.6.6 Describe how skeletal muscles are affected by exercise
- 1.6.7 Explain location of skeletal muscles related to movement they create
- 1.6.8 Identify major skeletal muscles and the action of each

Competency 1.7 Cardiovascular system structure and function

- 1.7.1 Name the organs of the cardiovascular system and their functions
- 1.7.2 Name and describe the locations of the major parts of the heart and discuss function of each
- 1.7.3 Trace the pathway of the blood through the heart and vessels of the coronary circulation
- 1.7.4 Discuss the cardiac cycle and explain how it is controlled
- 1.7.5 Identify parts of ECG pattern and discuss significance
- 1.7.6 Compare structures of major blood vessels and function of each
- 1.7.7 Explain how blood pressure and pulse is produced and controlled
- 1.7.8 Compare the pulmonary and systemic circuits of the system
- 1.7.9 Identify and locate major arteries and veins of circuits
- 1.7.10 Distinguish between an artery and vein microscopically

Competency 1.8 Nervous system

- 1.8.1 Describe the general structure of a neuron
- 1.8.2 Name four types of neuroglia cells and describe the functions of each
- 1.8.3 Describe the events leading to conduction of a nerve impulse
- 1.8.4 Explain differences in structure and function to classify neurons
- 1.8.5 Name the parts of a reflex and describe functions
- 1.8.6 Name the major parts of the brain and describe the functions of each part
- 1.8.7 Functionally distinguish between motor, sensory, and association areas of the cerebral cortex
- 1.8.8 Label the structure, form and function associated with cerebrospinal fluid
- 1.8.9 List the major parts of the peripheral nervous system
- 1.8.10 Name the major cranial nerves and their functions

- 1.8.11 Describe the structure of a spinal nerve
- 1.8.12 Describe the functions of the autonomic nervous system
- 1.8.13 Distinguish between the sympathetic and parasympathetic divisions of the autonomic nervous system
- 1.8.14 Describe the sympathetic and parasympathetic nerve pathway

Competency 1.9 Endocrine

- 1.9.1 Distinguish between endocrine and exocrine glands
- 1.9.2 Explain how steroid and nonsteroid hormones produce effects on target cells
- 1.9.3 Discuss how hormone secretions are regulated by the nervous system, concentrations of non hormonal substances, or other tropic hormones
- 1.9.4 Name and describe the location of the major endocrine glands and list the hormones they secrete
- 1.9.5 Describe general function and structure of the hormones
- 1.9.6 Explain how the secretion of each hormones is regulated

Competency 1.10 Blood

- 1.10.1 Describe general characteristics of blood and discuss major functions
- 1.10.2 Distinguish between the various types of blood cells bound in the bloodstream on gross and microscopic examination
- 1.10.3 Explain how red blood cell production is controlled and influenced
- 1.10.4 List the major components of blood plasma, and the function of each
- 1.10.5 Define hemostasis and explain mechanisms that maintain it
- 1.10.6 Explain major steps in blood coagulation
- 1.10.7 Explain the basis for blood typing, and adverse affects of blood transfusions
- 1.10.8 Describe the role of the white blood cell

Competency 1.11 Respiratory

- 1.11.1 List the general function of the respiratory system
- 1.11.2 Name and describe the locations of the organs of the system
- 1.11.3 Describe the functions of each organ
- 1.11.4 Explain how inspiration and expiration are accomplished
- 1.11.5 Name and define each of the respiratory air volumes and capacities
- 1.11.6 Locate the respiratory center and explain how it controls normal breathing
- 1.11.7 Discuss how factors affect the respiratory center
- 1.11.8 Describe the structure and function of the respiratory membrane
- 1.11.9 Explain how oxygen and carbon dioxide diffuse between the blood and tissues and how they are transported in blood
- 1.11.10 Discuss major/common respiratory disorders
- 1.11.11 Determine the rate of respiration and minute ventilation

Competency 1.12 Digestive

- 1.12.1 Name and describe the locations of the digestive organs and their major parts
- 1.12.2 Describe the general functions of each digestive organ and the liver
- 1.12.3 Describe the structure of the alimentary canal wall from gross and microscopic perspectives

- 1.12.4 Explain how the contents of the alimentary canal are mixed and move along the digestive tract
- 1.12.5 Describe the swallowing mechanism
- 1.12.6 List the enzymes secreted by the various digestive organs and describe the function of each enzyme as it relates to its substrate
- 1.12.7 Describe how digestive secretions are regulated
- 1.12.8 Explain how the products of digestion are absorbed
- 1.12.9 Compare and contrast peristalsis and segmentation
- 1.12.10 Discuss nutritional needs for normal caloric intake
- 1.12.11 Discuss the importance of water as a nutritional resource

Competency 1.13 Urinary

- 1.13.1 Name the organs of the system and their functions
- 1.13.2 Describe the location and structure of the kidneys
- 1.13.3 List the functions of the kidneys
- 1.13.4 Trace the pathway of blood through the major vessels of the kidneys
- 1.13.5 Describe a nephron, and explain the functions of these structures
- 1.13.6 Explain how the glomerular filtrate is produced and describe its composition
- 1.13.7 Explain how factors affect the rate of glomerular filtration and how this rate is regulated
- 1.13.8 Identify normal/abnormal constituent of urine
- 1.13.9 Discuss the role of tubular reabsorption in urine formation

Competency 1.14 Reproductive (Male and Female)

- 1.14.1 Name the parts of the male and female reproductive systems, and describe the general functions of each part
- 1.14.2 Describe the structure of a testis and explain how sperm is produced
- 1.14.3 Trace the path followed by sperm cells from formation to outside
- 1.14.4 Explain how hormones control the activities of the male and female reproductive organs
- 1.14.5 Describe the structure of an ovary and explain how egg cells and follicles are formed
- 1.14.6 Trace the path followed by an egg cell after ovulation
- 1.14.7 Describe the major events of the menstrual and ovarian cycles. Include roles of pituitary and steroid hormone levels on these cycles
- 1.14.8 Describe how hormonal levels change if pregnancy occurs
- 1.14.9 Describe the structure of the mammary glands

Topics not listed, but which may be addressed

Water, electrolyte, and Acid-Base Balance
 Lymphatic System and Immunity
 Pregnancy, Growth, and Development
 Cellular Metabolism

TECHNOLOGY STANDARDS

Standard 1: Nature of Technology

Students develop an understanding of technology, its characteristics, scope, core concepts* and relationships between technologies and other fields.

Benchmark A: Synthesize information, evaluate and make decisions about technologies.

Benchmark B: Apply technological knowledge in decision-making.

Benchmark C: Examine the synergy between and among technologies and other fields of study when solving technological problems.

Standard 2: Technology and Society Interaction

Students recognize interactions among society, the environment and technology, and understand technology's relationship with history. Consideration of these concepts forms a foundation for engaging in responsible and ethical use of technology.

Benchmark A: Interpret and practice responsible citizenship relative to technology.

Benchmark B: Demonstrate the relationship among people, technology and the environment.

Benchmark C: Interpret and evaluate the influence of technology throughout history, and predict its impact on the future.

Benchmark D: Analyze ethical and legal technology issues and formulate solutions and strategies that foster responsible technology usage.

Benchmark E: Forecast the impact of technological products and systems.

Standard 3: Technology for Productivity Applications

Students learn the operations of technology through the usage of technology and productivity tools.

Benchmark A: Integrate conceptual knowledge of technology systems in determining practical applications for learning and technical problem-solving.

Benchmark B: Identify, select and apply appropriate technology tools and resources to produce creative works and to construct technology-enhanced models.

Standard 4: Technology and Communication Applications

Students use an array of technologies and apply design concepts to communicate with multiple audiences, acquire and disseminate information and enhance learning.

Benchmark A: Apply appropriate communication design principles in published and presented projects.

Benchmark B: Create, publish and present information, utilizing formats appropriate to the content and audience.

Benchmark C: Identify communication needs, select appropriate communication tools and design collaborative interactive projects and activities to communicate with others, incorporating emerging technologies.

Standard 5: Technology and Information Literacy

Students engage in information literacy strategies, use the Internet, technology tools and resources, and apply information-management skills to answer questions and expand knowledge.

Benchmark A: Determine and apply an evaluative process to all information sources chosen for a project.

Benchmark B: Apply a research process model to conduct research and meet information needs.

Benchmark C: Formulate advanced search strategies, demonstrating an understanding of the strengths and limitations of the Internet, and evaluate the quality and appropriate use of Internet resources.

Benchmark D: Evaluate choices of electronic resources and determine their strengths and limitations.

Standard 6: Design

Students apply a number of problem-solving strategies demonstrating the nature of design, the role of engineering and the role of assessment.

Benchmark A: Identify and produce a product or system using a design process, evaluate the final solution and communicate the findings.

Benchmark B: Recognize the role of teamwork in engineering design and of prototyping in the design process.

Benchmark C: Understand and apply research, development and experimentation to problem-solving.

Standard 7: Designed World

Students understand how the physical, informational and bio-related technological systems of the designed world are brought about by the design process. Critical to this will be students' understanding of their role in the designed world: its processes, products, standards, services, history, future, issues and career connections.

Benchmark A: Classify, demonstrate, examine, and appraise energy and power technologies.

Benchmark B: Classify, demonstrate, examine and appraise transportation technologies.

Benchmark C: Classify, demonstrate, examine and appraise manufacturing technologies.

Benchmark D: Classify, demonstrate, examine and appraise construction technologies.

Benchmark E: Classify, demonstrate, examine and appraise information and communication technologies

Benchmark F: Classify, demonstrate, examine and appraise medical technologies.

Benchmark G: Classify, demonstrate, examine and appraise agricultural and related biotechnologies.

Performance Measures/Student Assessment/Instructional Strategies

Assessments/Evaluations

- Observations
- Demonstrations
- Portfolios
- Standardized Tests
- Class Assignment
- Quizzes/Tests/Exams

Instructional Strategies

- Teacher-Directed & Student-Centered Activities
- Case Study Problem Solving
- Cooperative Learning
- Project-Based Learning
- Career-Based Learning (Internships/Shadowing/Placement)
- Community-Based Learning (CTSOs and Other)
- Exploratory Learning
- Independent Research
- Team Teaching

Content Specific Strategies