

Exercise Science

Curriculum/Content Area: Health Education	Course Length: 1 Term
Course Title: Exercise Science	Date last reviewed: September 2016
Prerequisites: Biology and PE 9.	Board approval date: December 13, 2016

Desired Results

Course description and purpose:

This is an elective course designed for students considering careers in the medical field. Students will explore several concepts in the field of kinesiology related to careers in physical or occupational therapy, sports medicine, nursing, athletic training, coaching, physical education, recreation, recreational therapy, and corporate fitness. Students will study the skeletal structure and function of muscle use, efficient movement techniques, and training techniques. The course will include laboratory work and on-site field trips for first-hand health related career experiences. At the conclusion of this course, students will know the skeletal system, the major muscles of voluntary control, structure of striated muscle tissue, the physiology of muscular function, the effects of exercise on the nervous, circulatory, and cardiorespiratory systems and the overall nutritional and metabolic impact of exercise and training.

Enduring Understandings (EUs):	Essential Questions (EQs):
<ol style="list-style-type: none">1. The human body is comprised of many body systems that are interdependent.2. The human body responds in a variety of ways to acute exercise.3. During chronic exercise, the human body undergoes several physiological adaptations that influences performance.4. Nutrition and metabolism directly impact exercise and training.5. Personal goal-setting and fitness programs are an important component of achieving and maintaining a healthy lifestyle.6. Exercise science is a dynamic field that continually evolves through emerging research that requires critical thinking and analysis.7. Exercise science includes concepts that serve as the basis for many health-related careers.	<ol style="list-style-type: none">1. What are the major bones and muscles of the musculoskeletal system?2. What do you know about the physiological effects of exercise on the human body?3. What short-term and long-term effects does exercise have on you?4. How does exercise affect the systems?5. How do you improve technique of a sports specific skill and prevent injury?6. What is personal fitness? How fit am I?7. What are the important steps to creating a training program?8. What are possible careers related to the field of exercise science?

Assessment Evidence:

<p><i>Performance assessments include but are not limited to:</i></p> <ul style="list-style-type: none">• Case Studies• Basic Health Assessments• Research Paper• Fitness Program	<p><i>Other assessments may include:</i></p> <ul style="list-style-type: none">• Classroom formative and summative assessments aligned to standards.
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Unit 1 Title: Skeletal System and Structure/Function of Exercising Muscle

Topics:

- A. Major bones of the skeletal system
- B. Terms of skeletal movement
- C. Functional anatomy of the skeletal muscle, specifically: muscle fibers (transverse tubules, sarcoplasmic reticulum, myofibrils, etc)
- D. Muscle fiber types
- E. Major muscles of the muscular system

Standards:

Wisconsin Standards for Health Science

HSF1.a: Relate the knowledge of structures to the functions of the human body.

HSF9.a: Apply health science concepts to identify behaviors that promote health and wellness.

HSF2.b: Utilize medical terminology appropriate to a specific health science occupation.

HSF4.a: Demonstrate personal traits of healthcare professionals and positive work behaviors for retaining employment in the healthcare industry.

HSF4.b: Examine health care opportunities to develop a quality career path

Learning Targets:

- I can compare the structures of the skeletal system and its relationship to movement.
- I can compare the structures of the muscular system and its relationship to movement.
- I can analyze and synthesize a gross motor movement.
- I can identify the main functions and structural features of different types of muscle fibers.
- I can evaluate and interpret muscle fiber type as it relates to anaerobic movement.
- I can understand the reflex action and the involvement of the Muscle Spindles and Golgi Tendon Organs in performance.

Unit 2 Title: Fuel for Exercise (Metabolic Concepts)

Topics:

- A. Nutrients (Energy Substrates)
- B. The Basic Energy Systems
- C. Pre and Post-Competition Meals
- D. Carbohydrate loading
- E. Hydration
- F. Sports drinks

Standards:

Wisconsin Standards for Health Science

HSF1.a: Relate the knowledge of structures to the functions of the human body.

HSF9.a: Apply health science concepts to identify behaviors that promote health and wellness.

Learning Targets:

- I can demonstrate my understanding of the main nutrients, their function, and a variety of food sources.
- I can explore how nutrition affects performance.
- I can determine how ATP is used for muscle contraction and demonstrate my understanding of the energy continuum.

Unit 3 Title: Energy Expenditure and Fatigue

Topics::

- A. VO2Max
- B. Fatigue
- C. Lactate threshold

Standards:

Wisconsin Standards for Health Science

HSF1.a: Relate the knowledge of structures to the functions of the human body.

HSF1.c: Use appropriate mathematical tools as they apply to the practice of healthcare.

HSF9.a: Apply health science concepts to identify behaviors that promote health and wellness.

HSF10.a: Apply diagnostic procedures for measuring and recording vital signs including the normal ranges.

HSF2.b: Utilize medical terminology appropriate to a specific health science occupation.

HSF4.a: Demonstrate personal traits of healthcare professionals and positive work behaviors for retaining employment in the healthcare industry.

HSF4.b: Examine health care opportunities to develop a quality career path

Learning Targets:

- I can understand how VO2Max can be a predictor of aerobic fitness and performance potential.
- I can estimate VO2Max by means of several field tests.
- I can identify and explain factors that are associated with maximal exercise performance and muscle fatigue.
- I can develop skills and aptitudes required for a health-related career.

Unit Title 4: The Respiratory System Response to Exercise

Topics:

- A. Pathway of Air
- B. Gas Exchange

Standards:

Wisconsin Standards for Health Science

HSF1.a: Relate the knowledge of structures to the functions of the human body.

HSF9.a: Apply health science concepts to identify behaviors that promote health and wellness.

HSF10.a: Apply diagnostic procedures for measuring and recording vital signs including the normal ranges.

Learning Targets:

- I can comprehend the basic structure and function of the lung and how it relates to the respiratory system.
- I can explore how negative feedback regulations of CO2 and O2 influence the rate and depth of breathing.

Unit Title 5: The Cardiovascular System Response to Exercise

Topics:

- A. Heart
- B. Circulation
- C. Blood Vessels
- D. Blood
- E. Blood Pressure
- F. Heart Rate (Pulse)

Standards:

Wisconsin Standards for Health Science

HSF1.a: Relate the knowledge of structures to the functions of the human body.

HSF1.c: Use appropriate mathematical tools as they apply to the practice of healthcare.

HSF9.a: Apply health science concepts to identify behaviors that promote health and wellness.

HSF10.a: Apply diagnostic procedures for measuring and recording vital signs including the normal ranges.

Learning Targets:

- I can explain a variety of ways the cardiovascular system and respiratory system respond to acute and chronic exercise.
- I can explain the role the cardiovascular system plays in guaranteeing an adequate blood supply.
- I can explore how the human heart rate responds to a variety of activity/stimuli.
 - I can decide how much data is needed to produce reliable measurements and consider any limitations on the precision of the data.
 - I can analyze data systematically, to test whether data is consistent with a hypothesis.
 - I can evaluate the strength of the conclusion that can be inferred from any data set.

Unit 6: Principles of Exercise Training**Topics:**

- A. Components of Fitness
- B. Muscle Spindles and Golgi Tendon Organs
- C. Training Principles
- D. Types of Resistance Training
- E. Types of Anaerobic and Aerobic Training
- F. Rate of Perceived Exertion
- G. Target Heart Rate
- H. FITT Principle

Standards**Wisconsin Standards for Health Science**

HSF1.c: Use appropriate mathematical tools as they apply to the practice of healthcare.

HSF9.a: Apply health science concepts to identify behaviors that promote health and wellness.

HSF10.a: Apply diagnostic procedures for measuring and recording vital signs including the normal ranges.

Learning Targets:

- I can identify and describe the health-related components of physical fitness (cardiorespiratory endurance, muscular strength and endurance, flexibility, body composition) as well as skill related fitness (agility, balance, power, reaction time, coordination and speed).
- I can utilize strategies to facilitate behavior changes and promote exercise adherence by creating a personal fitness plan.

Unit Title: Current Trends and Topics in Exercise Science

Topics:

A. Determined by student interest

Standards:

CCSS.R.1.11-12 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account

CCSS.R.6.11-12 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

CCSS.SL.1.11-12 Initiate and participate effectively in a range of collaborative discussions (one on one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

CCSS.SL.4.11-12 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

Learning Targets:

- I can formulate opposing viewpoint responses on a controversial topic involved in sports science by:
 - Analyzing media
 - Citing evidence that supports my opinion
 - Listing evidence that oppose my opinion
 - Convey my viewpoint in a discussion using specific evidence to support my response