COURSE OUTLINE

HEFI 303 - Exercise Physiology

Prepared By:  Deborah Molnar
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SCHOOL OF SCIENCE, HEALTH, AND CRIMINAL JUSTICE
Health and Fitness Promotion
MAY 2012
Revised May 2015
HEFI 303 Exercise Physiology

A. **TITLE:** Exercise Physiology

B. **COURSE NUMBER:** HEFI 303

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:** 3 hours lecture per week

H. **CATALOG DESCRIPTION:**
Students study immediate and long term physiological responses and adaptations to exercise. Specifically, the role of the musculoskeletal, neuromuscular, cardiovascular, and respiratory systems in regulating exercise is covered in detail and adaptations of these systems to exercise are discussed. Environmental and hormonal influences are also included. Students explore specific aspects of training for sports performance.

I. **PRE-REQUISITES/CO-COURSES:** BIOL 217 & 218, or permission of instructor

J. **GOALS (STUDENT LEARNING OUTCOMES):**
By the end of this course the student will be able to:

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<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>a. Describe structure and function of muscle relative to production of body movement.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>b. Discuss the role of the nervous system in coordination of muscle action.</td>
<td>2. Crit. Thinking</td>
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<td>c. Discuss the body’s ability to meet the energy needs for exercise.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>d. Explain adaptations of the cardiovascular and respiratory systems to meet the demands of exercise.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>e. Compare and contrast how the body adapts to exercise under unusual environmental conditions.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>f. Discuss methods of optimizing training to enhance sports performance.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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L. **REFERENCES:** Exercise Physiology: Energy, Nutrition, and Human Performance, McCardle, WD, Katch, FI, Katch, VL, Lippincott Williams & Wilkins, 2006.

M. **EQUIPMENT:** Technology enhanced classroom.

N. **GRADING METHOD:** A – F
O. **MEASUREMENT CRITERIA/METHODS:**
  Written exams  
  Written homework  
  Discussion postings  
  Topic paper

P. **DETAILED COURSE OUTLINE:**
I. **Essentials of Movement**
   A. Musculoskeletal control of movement  
      1. Skeletal muscle structure  
      2. Skeletal muscle function  
      3. Slow twitch vs fast twitch muscle fibers  
      4. Recruitment for exercise  
   B. Neurological control of movement  
      1. Nervous system overview  
      2. Function of Central Nervous System  
      3. Function of Peripheral Nervous System  
      4. Sensory Motor Integration  
   C. Neuromuscular adaptations to exercise  
      1. Strength, Power, Endurance  
      2. Basic Principles of resistance training  
      3. Strengthening  
      4. Muscle soreness (acute vs DOMS)  
      5. Components of resistance training programs

II. **Energy for Movement**
   A. Metabolism and energy systems  
      1. Energy sources  
      2. Energy systems  
      3. Measurement of energy  
      4. Energy expenditure  
      5. Fatigue  
   B. Hormonal regulation of exercise  
      1. Hormone classifications and actions  
      2. Specific hormones related to physical activity  
      3. Hormone response to exercise  
   C. Metabolic adaptations to exercise  
      1. Adaptation to aerobic training  
      2. Adaptation to anaerobic training

III. **Cardiovascular and Respiratory Function**
   A. Cardiovascular control during exercise  
      1. Overview of cardiovascular anatomy and function  
      2. Cardiovascular response to exercise  
   B. Respiratory regulation during exercise  
      1. Ventilation  
      2. Gas Exchange  
      3. Regulation of ventilation  
      4. Respiratory limitations to physical activity  
   C. Cardiovascular and Respiratory adaptations to exercise  
      1. Evaluating aerobic capacity (VO₂max)  
      2. Cardiovascular adaptations to aerobic exercise  
      3. Respiratory adaptations to aerobic exercise  
      4. Metabolic adaptations to endurance training  
      5. Factors affecting cardiorespiratory exercise response  
      6. Relationship of endurance to sport performance
IV. Environmental Influences on Performance
   A. Exercise in hot and cold environments
      1. Regulation of body temperature
      2. Physiologic response to exercise in heat
      3. Physiologic response to exercise in cold
      4. Acclimatization
   B. Exercise in hypobaric, hyperbaric, and microgravity environments
      1. Physiologic response to altitude
      2. Water immersion exercise
      3. Physiologic response to microgravity

IV. Sports Performance
   A. Training for Sport
      1. Overload principle of training
      2. Excessive training
      3. Tapering training
      4. Detraining
      5. Retraining
   B. Ergogenic Aids and Sport
      1. Pharmacological
      2. Hormonal
      3. Physiological
      4. Nutritional

Q. LABORATORY OUTLINE: N/A