

**University of Louisiana at Lafayette
College of Education
Class Syllabus**

**Course : Kinesiology 303 (001)
Schedule: MWF 9:30-10:20**

**Semester: Fall 2006
Location: Bourgeois 108A**

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**Office: 129-A
Office Hours: TBA**

Course Description

Kinesiology 303 :Physiology of Exercise (3,0,3)

Emphasis on muscular efficiency, recovery, chemical changes and neuromuscular control, with special reference to sports, corrective work and regular work. Coreq: Kines 304.

Required Text

Powers,S.K. and Howley, E.T. Exercise Physiology : Theory and application to Fitness and Performance WCB McGraw-Hill, Dubuque, Iowa, 2001.

Conceptual Framework: The Responsive Professional

The conceptual framework of the UL Lafayette College of Education is designed to expand upon the institution's commitment to be a responsive university. Teacher candidates are expected to demonstrate knowledge, skills, and dispositions associated with the four elements of a Responsive Professional. Responsive Professionals demonstrate expertise in knowledge and practice. They are reflective practitioners who respect diversity and demonstrate a commitment to professionalism.

Course Objectives and Corresponding Unit Outcomes

Behavioral Objectives for:

A. Energy Sources (Content Knowledge)

The student will be able to:

1. List, name and describe all energy sources utilized by the muscle during anaerobic and/or aerobic metabolism.
2. Define anaerobic and aerobic glycolysis, and determine the end products, energy yield, and efficiency of each.
3. Identify the functions of the Krebs Cycle and electron transport system in the oxidation of glucose and free fatty acids.
4. To identify the relative contribution of anaerobic and aerobic energy to various activities.
5. Identify the factors which determine the energy source being used at any given time during rest/or exercise of various durations and intensities.
6. List and identify the chronic physiological effects of aerobic physical training .

B. Recovery from Exercise and Fatigue (Content Knowledge)

The student will be able to:

- 1 Explain the relationship between muscle fatigue and depletion (restoration) of various energy sources.
2. Relate the concepts of anaerobic capacity, anaerobic threshold, and aerobic power, to performance of short term and long term work.
3. Explain the differences in recovery time and the processes for each of the following:
 - a. Continuous work of long duration
 - b. Discontinuous work of at least 30 minutes-1 hour's duration
 - c. Repeated days of effort
4. Describe how lactic acid limits performance and the means by which lactic acid may be removed from the body.
5. Describe how rest, activity, diet and intensity are inter-related in the depletion and restoration of muscle and liver glycogen during various types of effort.
6. Identify and list the effect of chronic physical training on recovery processes.

C. Skeletal Muscle Structure and Function (Content Knowledge)

1. Define the "all or none law" of muscle fiber contraction and how the strength of a muscle contraction is graded.
2. Discuss the recruitment and asynchronous firing of motor units in regard to strength and muscle endurance.
3. Outline the major steps necessary for a muscle fiber to contract including initiation and propagation of a motor nerve impulse as well as the sliding filament theory.
4. Identify and describe the characteristics, functions and significance of various muscle fiber types.
5. Explain the effect of chronic physical training on the various muscle fiber types with implications for success in various sports related activities.
6. Identify the possible sites and causes of muscular fatigue.

D. Development of Muscular Strength, Endurance and Flexibility (Content Knowledge)

The student will be able to:

1. Differentiate among static (isometric), isokinetic, isotonic contractions, between negative (eccentric) and positive (concentric) work, and list several advantages and disadvantages of each as a training medium.
2. Identify the various physiological and anatomical changes associated with muscle hypertrophy and increased strength.
3. Explain the over-load principle for development of strength and endurance, and outline various examples of programs for specific development of each.
4. Define flexibility, list structural limits, and explain the various types of flexibility techniques.
5. List and explain at least three possible causes of muscle soreness.
6. Identify the physiological benefits of a proper warm-up and cool-down.

E. Pulmonary Ventilation

The student will be able to: (Content Knowledge)

1. Identify the various volumes of lung function and ventilatory changes that occur during exercise and recovery.
2. Describe the neurohumoral control of ventilation during exercise, rest and recovery.
3. Identify the effects of age, sex, and chronic training on lung volumes, maximum ventilation and a $-vO_2$ difference with respect to exercise and athletic performance.

F. Gas Exchange and Gas Transport (Content Knowledge)

The student will be able to:

1. Explain the transport of O_2 and CO_2 within the blood.
2. Explain how partial pressure of gases influence the exchange of O_2 & CO_2 in the body.
3. Explain the relationship between oxygen consumption and ventilation during various stages of work including rest, steady state exercise, maximum exercise, and recovery.

G. Cardiovascular Function and Blood Flow (Content Knowledge) (Advocacy- Disp 1,2,4,5,7, CF-K9,CF-D1, CF-D4, CF-P1, CF-P2, CF-P5, CF-P6)

The student will be able to:

1. Explain and identify cardiovascular responses to exercise including the following variables: heart rate, stroke volume, cardiac output, blood flow, blood pressure and a $-vO_2$ difference.
2. Explain and identify the cardiovascular adaptations including resting, exercise of various intensities, and recovery measures to chronic exercise.
3. Draw and graph a typical heart-rate response curve to exercise.
4. Explain the age and sex-related differences in cardiovascular responses to acute and chronic exercise.

H. Methods of Physical Training (Content Knowledge), (Planning Disp 2,5,6,7,8 CF-K2,3,4,5,6,7,8, CF-R2,3, CF-D1,2,3,5, CF-P1)

The student will be able to:

1. Define and identify the basic physiological training principles.
2. Explain and apply the over-load principle (including frequency, intensity, and duration) to various training regimens for development of cardiovascular function.
3. Define interval training and specifically explain how work-relief interval ratios are used to develop various energy systems.
4. Demonstrate a knowledge of various training methods for development of each energy system.
5. Design and develop sample training prescriptions for various sports and year round training.
6. Explain the process of training and detraining adaptations including specificity, adaptability curves, frequency and duration of training and genetic limitations.

I. Exercise and Training in Special Populations (Advocacy- Disp 1,2,4,5,7, CF-K9,CF-D1, CF-D4, CF-P1, CF-P2, CF-P5, CF-P6)

The student will be able:

1. To compare and contrast the female and male in related athletic performance records, body composition, strength, aerobic capacity, anaerobic capacity and training adaptability.
2. To identify and list effect of aging on physical performance, body composition, exercise responses, and training adaptability.
3. To compare the acute exercise and chronic training responses of children with those of adults.
4. To discuss gynecological considerations of the exercising female subsequent to intense exercise and chronic training for each of the following variables: iron deficiency, breast and reproductive organs, menstruation, menarche and pregnancy.

J. Exercise and Training for Health and Fitness (Planning Disp 2,5,6,7,8 CF-K2,3,4,5,6,7,8, CF-R2,3, CF-D1,2,3,5, CF-P1)

The student will be able to:

1. Discuss the beneficial role of regular exercise in modification of cardiovascular disease, associated risk factors, and increased physical work capacity.
2. Develop an exercise prescription based on a fitness evaluation using recommended ACSM and other approved guidelines for quantity and quality of exercise.

K. Environmental Aspects of Exercise and Athletic Performance. (Content Knowledge)

The student will be able to:

1. Identify the major physiological adaptations and associated risks that occur as a consequence of scuba diving.
 2. List the resting and exercise physiological adaptations that occur with increasing altitude and how physical work capacity is affected.
 3. Explain the physiological process of acclimatization to altitude and how these adaptations affect physical work capacity at both altitude and sea level.
 4. List and explain the basic physiological responses to heat stress that occur during work and how body heat may be dissipated.
 5. Explain how climate (wet vs. dry), level of activity, wind velocity, hydration, ionic balance, clothing (including vapor barrier), body type and physical conditioning affect the physiological responses and risk associated with heat stress.
 6. Describe the process of acclimatization and outline the physiological modifications of heat stress responses to work, including plasma volume, sweat composition rate, ionic conservation, balance core, and skin temperature.
 7. Explain the process of effective fluid and electrolyte balance and identify the advantages and disadvantages of various fluid/electrolyte replacements, including water, glucose/saline solutions and beer. (Content Knowledge)
8. Show how wet bulb and dry bulb temperature measures can be used to establish guidelines for work in hot, humid environments. (Planning Disp 2,5,6,7,8 CF-K2,3,4,5,6,7,8, CF-R2,3, CF-D1,2,3,5, CF-P1)
9. Describe the physiological responses to cold and the effects of wind chill and a cold

environment on exercise performance.

L. Nutrition and Weight Control (Content Knowledge)

The student will be able to:

1. Explain the relationship between physical activity, body composition and obesity.
2. Identify the various techniques of determining body composition and ideal levels of percent body fat for various populations.
3. Outline basic nutritional needs and energy requirements of the exercising athlete and non-athlete, including supplements, as well as pre/post competition or activity meals.
4. With the aid of a calorie value and expenditure table be able to prescribe exercise as part of a fat reduction program.
5. Identify the three basic components of body types and the relationship between physical activity and body type.
6. Identify the detrimental effects of rapid excessive weight loss on athletic performance.

M. Endocrine Responses to Exercise and Acid-Base Balance (Content Knowledge)

The student will be able to:

1. Identify the means by which the body maintains internal acid-base balance and define the buffer system.
2. Explain the effects of severe exercise on acid-base balance and the significance of plasma bicarbonate as a buffer.
3. Define the function of hormones and identify the six major glands and their most important hormone secretions.
4. Identify and explain the hormonal responses to exercise and training.

Course Requirements

The Kinesiology student will Apply the TEACHER AS A Responsive Professional model to exercise science by demonstrating a proficiency with a minimum grade of 70% on each written discussion exam for the following .

PASS-PORT Artifacts

Not Applicable

Field Experiences

Not applicable

Technology Integration

Laboratory experiences with extensive technology will be coordinated with kinesiology

Course Evaluation

Evaluations: Each of the criterion measures is listed as a weighted percentage of 100% of the final course grade.

1. Exam I	33%
2. Exam II	33%
3. Final Examination	34%
TOTAL	100%

Exam dates will be announced one week prior to exam date

NOTE: All make-up exams will be ORAL.

The Final Exam will be administered during the exam period.

ORIGINALITY OF WORK: Anything you submit for grade under your name should be your own original work. This includes laboratory reports and term projects, as well as examination papers. On labs you may work together in deciding how a report should be approached, but the wording of the report should be your own. Anyone found giving or receiving information even without consent will receive a zero on the examination concerned, and the event will be reported to the department chairman for his recommendations. **NOTE: All information taken from sources must be cited. Paraphrasing is not acceptable as a means of avoiding citing.**

Grading Scale:

TERM GRADES: Term grades will be based on a percentage of 100.

- A = 90-100 %
- B = 80- 89%
- C = 70- 79%
- D = 60- 69%
- F = 0- 63%

Resources

Professional Associations

American Alliance of Health, Physical Education, Recreation and Dance (AAHPERD)
American College of Sports Medicine (ACSM)

Professional Journals

International journal of sport nutrition
Journal of Applied Physiology
Journal of Sports Medicine and Physical Fitness
Medicine and science in sports and exercise
Research quarterly for exercise and sport
Strength and Conditioning
Journal of Strength and Conditioning Research

Related Materials and Resources

References

Textbook

Roberg,R. and Roberts S. (1997) Exercise Physiology :Exercise ,Performance and Clinical Applications. St. Louis: Mosby.

Powers,S. and Howley E. (1997) Exercise Physiology: theory and Application to Fitness and Sport. Dubuque: Brown and Benchmark.

McArdle,W., Katch I., and Katch V. (2001) Exercise Physiology : Enerngy, Nutrition, and Human Performance 5th Ed., Philadelphia: Lippincott ,Williams and Wilkins.

Course Policies and Procedures

Emergency Evacuation Procedures

A map of this floor is posted near the elevator marking the evacuation route and the Designated Route Area. This is an area where emergency service personnel will go first to look for individuals who need assistance in exiting the building. Student who may need assistance should identify themselves to the teaching faculty.

Attendance Policy

1.Any student missing more than 20% (8 absences for MWF classes and 5 absences for T-Th classes) of class periods will receive an F for the semester. Two tardies equal one absence. THERE ARE NO UN-EXCUSED ABSENCES.

2.No studying, reading a newspaper, answering study questions or any improper diversions in class.

3.No beepers or cell phones in class.

4.To remain in the class all students must follow the safety procedures set forth by the instructor.

5.If you have to leave class for any reason before the class is over it will count as an absence.

Academic Honesty

The College of Education adheres to the policy on academic honesty as outlined on page 427 in the Undergraduate Bulletin (2003-2005) .

Students Requiring Special Accommodations

Students requiring special accommodations must register with the Office of Services for Students with Disabilities and provide official documentation to the instructor in a timely manner.

Tentative Schedule

- 1. Energy Sources**
- 2. Recovery from Exercise and Fatigue**
- 3. Skeletal Muscle Structure and Function**
- 4. Development of Muscular Strength, Endurance and Flexibility**
- 5. Pulmonary Ventilation**
- 6. Gas Exchange and Gas Transport**
- 7. Cardiovascular Function and Blood Flow**
- 9. Exercise and Training in Special Populations**
 - 1. Female**
 - 2. Child**
 - 3. Elderly**
- 10. Exercise and Training for Health and Fitness**
- 11. Environmental Impact on Exercise and Athletic Performance**
- 12. Nutrition and Weight Control**
- 13. Endocrine Responses to Exercise and Acid-Base Balance**
- 14. Ergogenic Aids**