

KNES 303, Exercise Physiology

Instructor: Dr. J.M. Clemons
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Course Credit: 3 hours

Course Description: (3, 0, 3) Emphasis on muscular efficiency, recovery, chemical changes and neuromuscular control, with special reference to fitness, sports, work and corrective work.

Textbook: Exercise Physiology, Powers and Howley, 2004, WCB/McGraw Hill, St. Louis, MO.

General Course Objectives:

A student successfully completing this class should be able to

Energy Sources

1. define energy and describe energy sources
2. explain, in some detail, the role of the aerobic and anaerobic energy systems during rest and while engaging in various forms and levels of exercise.

Recovery from Exercise

3. explain the various components of recovery oxygen and also recovery of myoglobin stores.
4. explain the mechanisms involved in the replenishment of energy stores during recovery.
5. describe the production of lactic acid during exercise, reduction of lactic acid during recovery and its relationship to fatigue.
6. list practical recovery guidelines.
7. list and describe various ergometers and the advantages and disadvantages for testing and for exercise.
8. explain the purpose of elevated levels of oxygen consumption during exercise recovery.
9. describe the effect of light exercise on lactic acid levels

Measurement of energy, work and power

10. define energy, work and power.
11. distinguish between direct and indirect calorimetry.
12. list the specific caloric equivalents for carbohydrates, fats and proteins.
13. describe the respiratory exchange ratio and the factors that affect it.
14. estimate the energy cost of exercise.
15. describe efficiency and what inputs are required before it can be measured.
16. identify resting values for oxygen consumption, ventilation volume and heart rate.

Skeletal Muscle: Structure and Function

17. identify structure and explain the sliding filament theory of muscle contraction
18. explain the role of motor units in muscular contractions
19. list the different types of motor units and their characteristics
20. explain muscle force-velocity and power-velocity relationships

Development of Muscular Strength, Endurance and Flexibility

21. describe the structure of skeletal muscle.
22. explain the characteristics of fast twitch and slow twitch muscle fibers.
23. identify the probable sites of muscular fatigue.
24. describe muscle contraction (sliding filament theory)
25. explain the effects of strength training, aging and injuries on muscle fibers.
26. describe nervous control of muscular movement.

Pulmonary Ventilation (time permitting)

27. discuss ventilation at rest and during exercise.

28. define and explain hyperventilation.
29. explain the relationship between ventilatory threshold and anaerobic threshold (OBLA)
30. be familiar with standard lung volumes and capacities and appreciate their importance.
31. define and discuss second wind and side stitch.

Methods of Physical Training

32. describe in detail training principles relative to frequency, intensity, time and type.
33. train effectively the different energy systems.
34. relate training theory to practical situations.
35. list the physiological effects of chronic anaerobic and aerobic training
36. discuss various recommendations for carbohydrate, fat and protein intake
37. diet before, during and after physical activity.

Exercise, Body Composition and Weight Control

38. describe Sheldon's theories of somatotyping
39. discuss in detail energy balance and positive and negative energy balance.
40. relate the effects of various exercise intensities and different modes of training on the fatness of children, adults and the elderly.

Heat Balance: Exercise in the Heat and Cold (time permitting)

41. explain heat production, exchange and physiological mechanisms involved.
42. discuss temperature regulation
43. provide recommendations for exercising in heat and method for preventing heat disorders
44. discuss exercising in the cold and list physiological responses to cold exposure.

Attendance Policy

The university allows each faculty member to determine what constitutes excessive absences (excused or unexcused) as long as it is not less than 10% of the total number of class meetings (Undergraduate Bulletin, 2005-2007, Vol. 82, Number 1, April, 2005, page 443-444). Students enrolled in classes that meet three times per week will be allowed **five** absences (excused or unexcused). For this class, excused absences will be defined as: (1) illness [documented by a health professional], (2) serious accident [documented by police report or injury report] (3) required attendance at an authorized university sponsored event [documentation required] (4) or permission from the Instructor **PRIOR** to the class that is to be missed. Make up or extra credit is not allowed for unexcused absences.

If you exceed five absences, no points will be deducted from your grade (i.e., you will receive exactly what you earn for the class based upon the standard grading scale outlined below). If; however, grade adjustments or grade curves are instituted, you will **NOT** be allowed to benefit from such adjustments whether it occurs on a regular exam, final exam or in calculation of final grades. Upward adjustment of test scores is **NOT** an entitlement and will only be applied to those who meet the attendance standards outlined in this syllabus. It makes no sense to statistically enhance grades of students who miss class excessively.

Punctuality: Life is not predictable, therefore, it's understandable that on occasion one may be late; however, in doing so, it is likely to result in being marked absent due to the roll being called at the beginning of class. It is your responsibility to advise the Instructor when you come in late rather than attempt to slip in undetected. A revision of the attendance record should be made on the day the tardiness occurs and you should witness the instructor making the correction. Attempting to convince the teacher later in the semester that you were present on a date that you were marked absent is likely to be futile. **Being late once will be tolerated; however, there will be a penalty of one unexcused absence thereafter.** Please be on time, In a MWF. class of 30 students; if each student was late just once a semester, the class would be disrupted two out of three days throughout the entire semester. For this reason, a person who is late twice will be given an unexcused absence and each time thereafter will result in another unexcused absence.

Exams

All written tests will be objective (i.e., combinations of either multiple choice, true/false and matching). Four 50 pt. written exams, approximately two chapters covered in each test are expected), however, additional exams may be scheduled depending upon how much material is covered during the semester. All exams will be taken on Scantrons. Outside projects and readings (online and print) may be assigned for both credit and noncredit when necessary.

Grading Scale:

90% of total possible points	A
80%	B
70%	C
60%	D
Below 60%	F