

1-2014

## KIN 320.00: Physiology of Exercise

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**The University Of Montana**  
**Department of Health and Human Performance**  
**KIN 320 - Physiology of Exercise**

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Office hours: 8:30-11 am, Tuesday and Thursday (or by appointment)

**Course Description:**

This course is a study of the physiological changes and the significance of these changes as they occur during physical work, activity and exercise. The course will focus on: basic energy, musculoskeletal, nervous, cardiovascular and respiratory systems as they relate to aerobic and anaerobic exercise. Emphasis will be placed on the response of these systems to both acute exercise, and the adaptations to chronic exercise.

**Prereq:** BIOH 370 or 211, HHP 226 (KIN 201); co-requisite KIN 321.

**Semester:** Spring 2014

**Credits:** 3 credit hours

**Time:** MWF at 1:10-2:00 pm

**Place:** Lecture is held in ED 123

**Text:** Kenney, Wilmore and Costill, Physiology of Sport and Exercise; fifth edition; 2012, Human Kinetics, ISBN 978-0-7360-9409-2

*In the past:*

Powers and Howley, Exercise Physiology: theory and applications to fitness and performance; seventh edition; 2009, McGraw-Hill.

Wilmore, Costill and Kenney, Physiology of Sport and Exercise; fourth edition; 2008, Human Kinetics.

McArdle, Katch and Katch, Exercise Physiology: energy, nutrition, and human performance; sixth edition; 2007, Lippincott, Williams and Wilkins.

**Objective:**

Following this course students will have a general knowledge of the bodies' organ, and bioenergetic systems and how they respond and adapt to exercise.

**Course Evaluation:**

<u>Assessment Method</u>	<u>Percent of Total Grade</u>
Exams	65%
Exam I	20%
Exam II	20%
Exam III	20%
Exam IV	25%
Writing Assignments	10%
<u>Quizzes</u>	<u>25%</u>
Total	100%

**A. Examinations:** 4 total = 65% of grade. First three exams (20% each) will cover material up to date of exam. The final exam (25%) is accumulative. The lowest grade on the first three exams will not count for the final grade, however all exams MUST be completed! *Exam dates subject to change.*

Exam I: Monday, **February 24<sup>th</sup>** in class  
Exam II: Wednesday, **March 26<sup>th</sup>** in class  
Exam III: Wednesday, **May 7<sup>th</sup>** in class  
Exam IV: Wednesday, **May 14<sup>th</sup>, 3:20 pm** University Final Exam schedule

**B. Writing Assignments:** 10% of grade. There will be two writing assignments. These assignments are a practice in answering your own question. This is meant to teach you the methods by which you find valid resources to answer your own question, AND to teach you how to ask good questions! You will write a one page report on the research in answering your question (see details below for a template). Topics should be on exercise physiology, something from class or something you are particularly interested. The first assignment is due **March 14<sup>th</sup>**. The second assignment is due **April 18<sup>th</sup>**. Writing quality, grammar and spelling will be graded. See me if you want a question and/or a paper verified (Writing assignments are graded by your lab instructor (Cory Kaufman), but count towards your lecture grade.)

**C. Quizzes:** 25% of grade

Occasional quizzes will be given in class or as take home assignments. These are meant to keep you abreast of the information that will be evaluated on the exams. There will also be occasional 'Interpretive Questions', or scenarios that are meant to apply course material to the student's respective fields.

**Grading Scale:**

		A	93-100%	A-	90-92%
B+	88-89%	B	83-87%	B-	80-82%
C+	78-79%	C	73-77%	C-	70-72%
D+	68-69%	D	63-67%	D-	60-62%
F	<60%				

**Lecture Topics: Chapters are from Kenney et al. 5e**

- History of Exercise Physiology/Ruling bodies and Certifications Chapter 1
- Measurement of Work, Power, and Energy Expenditure Chapter 1
- Bioenergetics Chapter 2
- Hormonal Responses to Exercise Chapter 4
- **EXAM I February 24<sup>th</sup> in class (10 lectures)**
- Exercise Metabolism Chapter 5, 20
- Fatigue Chapter 19
- Nervous System Chapter 3
- Skeletal Muscle Chapter 1
- **EXAM II March 26<sup>th</sup> in class (12 lectures)**
- Cardiovascular Responses to Exercise Chapter 6, 8
- Respiration During Exercise Chapter 7, 8
- Principles of Training Chapter 9
- Adaptations to Training Chapter 10, 11
- Environment and Altitude Chapter 12, 13
- **EXAM III May 7<sup>th</sup> in class (12 lectures)**
- **EXAM IV Wednesday, May 14<sup>th</sup>, 3:20 pm ACCUMULATIVE**

## Question Report Template

You should start with a question of interest to you. Topic is of your choice, whatever you find interesting, but it must be exercise physiology, and hopefully salient to class information. To answer your question you should find a research article from a **peer reviewed journal**. Articles from magazines, websites, or other lay publications are NOT appropriate. Places to look: Journal of Applied Physiology, American Journal of Physiology, Medicine and Science in Sports and Exercise, European Journal of Applied Physiology, Journal of Strength and Conditioning, etc.... Use databases such as PubMed, MedLine, Science Direct, or Sports Discus to find articles on your subject of interest. Write-up should be no more than **ONE** word processed page. Writing (spelling/grammar) will be graded, use complete sentences! You also must include a *hardcopy* of the article with all figures and tables (print the **pdf** NOT the html version!). You should include the following headings in your write up:

**Question:** Clearly state your question of interest in exercise physiology.

**Full citation:** Use style from article. Must include hardcopy of article that addresses your question!

**Type of Research:** Original data, review, meta-analysis, etc...

**Methodology:** rough outline, but including: design, subj's, exercise protocol, timing of measurements, outcomes measured.

**Results:** What did they find?

**Impact:** What does it mean? How does it pertain to your question?

**Pros/Cons:** What was good/bad about the article?

These last two are the most important, what did YOU think of this research?

## Attendance and Exam Policy: (Very important! In reference to student code of ethics!)

**Absences:** Students are expected to attend all classes and be prepared to participate in class discussions and activities. Attendance will be taken at the beginning of each class period. If more than **five** classes are missed your grade will be dropped by 5% for every missed day there after. These are *five* excused OR unexcused absences!

**Tardiness:** Students are expected to arrive on time to class. If you have more than two tardies your final grade will be reduced by 1% for every other tardy (i.e. if you're late 5 times for class and you have a final grade of 94% you will end up with a grade of 89%). Arriving more than 20 minutes late for a class will be considered an absence. If you are late it will be your responsibility to make sure the attendance record indicates your presence by notifying the instructor at the end of class.

**Class Participation:** Students are expected to have completed all assigned readings and work before each class in order to be prepared to participate in class discussions.

**Cell Phone Policy:** Phones (and the like) are expected to be turned off for the duration of class time. If caught using your phone, you may be asked to leave the class for the remainder of the day. This day will then count towards one of your 5 absences.

**Exams:** A make-up exam will be given only at the discretion of the instructor and only in the case of unavoidable situations. If you miss a scheduled exam it is your responsibility to contact the instructor within 2 days of the missed exam to be eligible for a make-up exam. The instructor will then determine whether a make-up exam will be allowed. Messages left by telephone, email or in writing do not constitute an agreement for a make-up exam. No exams will be given earlier than the scheduled time.

## UM's POLICY ON ACADEMIC HONESTY – Students must read

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at

[http://life.umt.edu/vpsa/student\\_conduct.php](http://life.umt.edu/vpsa/student_conduct.php).

**Plagiarism:** Representing another person's words, ideas, data, or materials as one's own.

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and **Disability Services for Students (DSS)**. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

## Definition of Terms

*physical activity* - characteristic of all types of muscular activity associated with activities of daily living, work, play, and exercise

*exercise* - a subclass of physical activity, planned with goal of increasing physical fitness

*physical fitness* - broad term describing healthful levels of cardiovascular function, strength and flexibility, is specific to physical activity performed

*acute exercise* - one bout

*chronic exercise* - repeated bouts of exercise over weeks or months, exercise training

*physiology* - the biological study of the functions of living organisms and their parts, encapsulates: biochemistry, anatomy, biology, etc...

*ameliorate* - to make or become better, improve

*attenuate* - to weaken or decrease in force, intensity, effect, quantity or value

*augment* - to make larger, enlarge in size or extent, increase

*concomitant* - accompanying, concurrent, attending, at the same time

*exacerbate* - to increase the bitterness or violence of, aggravate

*confluence* - a flowing together of 2 or more streams, the place of junction, a coming together of people or things

*glucose transport* - the uptake of glucose by cells, controlled by the presence of a glucose transporter on the cellular membrane (GLUT4)

*gluconeogenesis* - the formation of glucose from gluconeogenic precursors (such as alanine, or amino acid, lactate, glycerol), essentially reverse glycolysis, in humans only thought to occur in liver.

*lipolysis* - the breakdown of triglycerides into three fatty acids which are then released into circulation to be used as an source for ATP, this breakdown is completed by the enzyme: hormone sensitive lipase

*lipogenesis* - the formation of triglycerides from fatty acids for storage

*glycogenolysis* - the breakdown of glycogen into glucose moieties, completed by the enzyme glycogen phosphorylase, can be done in muscle for immediate usage, or in liver to be released to the blood stream in the maintenance of blood glucose

*hepatic glucose output* - livers ability to maintain blood glucose during exercise or starvation by both glycogenolysis and gluconeogenesis

*glycogenesis* - (or glycogen synthesis) the formation of glycogen from glucose for storage, done by glycogen synthase

*catabolic* - breakdown of energy storage to be free for use in ATP formation (breakdown of triglycerides, glycogen, protein). The metabolic breakdown of complex molecules into simpler ones, resulting in a release of energy.

*anabolic* - storage of energy for later use, constructive metabolism (formation of triglycerides, glycogen, and protein)

*androgenic* - development and maintenance of secondary sexual characteristics