

Muscle Biology
Fall 2015
HHS402G
Time M & W
8:30 AM - 9:45 AM
College of Nursing . Room 501B

Instructors: [Esther E. Dupont-Versteegden](#), PhD (Associate Professor, Dept. Rehabilitation Sciences); [Karyn A. Esser](#), PhD (Professor, Dept. of Physiology); [Tim Butterfield](#), PhD (Assistant Professor, Dept. Rehabilitation Science); [Kenneth S. Campbell](#), PhD (Associate Professor, Dept. of Physiology); [Robin L. Cooper](#), PhD (Associate Professor, Biology). Team taught course. (See web page link associated with each name above).

Office: Wethington Building (Dr. Dupont-Versteegden's office)

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Advanced study of skeletal muscle structure and function. Comparative biology of muscle will be covered in regard to structure and function. Physiology and pathophysiology in respect to human health will be addressed in terms of research presentations and literature review.

Prerequisite: One course of general biology (Bio148 or Bio150 or Bio152, or a general anatomy/physiology (i.e., PGY206) course or permission of instructor.

Meeting times: **M & W 8:30 AM - 9:45 AM College of Nursing . Room 501B**

Office Hours: by appointment

Office Location: CTW415

Office Phone: 859-218 0592

Email: eedupo2@uky.edu

Required text:

Skeletal Muscle Structure, Function, and Plasticity

Author(s): Richard L Lieber PhD

Publication Date: Sep 23, 2009

Format: Book

Edition: Third 2010

ISBN/ISSN: 9780781775939

Cost: ~ \$60

Supplementary Materials:

1. Readings from the primary literature will be assigned on occasion. These articles will be posted on Blackboard for you to download and print.

2. Fundamental Biology and Mechanisms of Disease (two volume series)

Editors: Hil & Olson

Release Date: 18 Jul 2012

Academic Press

ISBN: 9780123815101

Pages: 1392

A copy will be held in reserve in the UK Library for student access.

Course Websites: Blackboard: [syllabus, course announcements, study advice, class notes]

Tentative Class Schedule:

Aug 29. Introduction to the course; Library research methods; Assignments

Dr. Dupont-Versteegden & Dr. Cooper

Sept 3. Introduction to skeletal muscle anatomy: Cellular organization. TEXT Chapter 1, pp. 1-39. **Dr. Esser**

Sept 5. Introduction to skeletal muscle anatomy: Cellular organization. TEXT Chapter 1, pp. 1-39. **Dr. Esser**

Sept 10. Introduction to skeletal muscle anatomy: Cellular organization. TEXT Chapter 1, pp. 1-39. Research & current topics. **Dr. Esser**

Sept 12. Skeletal muscle physiology/ Sarcomere forces. TEXT Chapter 2, pp. 41-90
Dr. Campbell

Sept 17. Skeletal muscle physiology/ Sarcomere forces. TEXT Chapter 2, pp. 41-90
Dr. Campbell

Sept 19. Skeletal muscle physiology/ Sarcomere forces. TEXT Chapter 2, pp. 41-90
Dr. Campbell

*Sept 24. **Exam 1. Chapters 1&2, any reading material assigned and content covered in class**

Sept 26. The production of movement. TEXT Chapter 3, pp.93-137
Dr. Butterfield

Oct 1. The production of movement. TEXT Chapter 3, pp.93-137
Dr. Butterfield

Oct 3. The production of movement. TEXT Chapter 3, pp.93-137
Dr. Butterfield

- Oct 8. Comparative review of skeletal muscle function (handouts). Skeletal muscle adaptation to increased use, TEXT Chapter 4, pp.141-180. **Dr. Cooper**
- Oct 10. Skeletal muscle adaptation to increased use, TEXT Chapter 4, pp.141-180. **Dr. Cooper**
- Oct 15. Hypertrophy and exercise. (handouts). **Dr. Esser**
- Oct 17. Outline of an primary research article or research of a muscle disease or comparative muscle review (<500 word article for the public, i.e. newspaper or magazine due). Students will quickly state in class the general topics they are working. Continue on Skeletal muscle adaptation to increased use, TEXT Chapter 4, pp.141-180. **Dr. Cooper**
- Oct 22. **Exam 2. Chapters 1-4 (cumulative knowledge). Any reading material assigned and content covered in class**
- Oct 24. Skeletal muscle adaptation to decreased use. TEXT Chapter 5, pp.183-226
Dr. Dupont-Versteegden
- Oct 29. Skeletal muscle adaptation to decreased use. TEXT Chapter 5, pp.183-226
Dr. Dupont-Versteegden
- Oct 31. Skeletal muscle adaptation to decreased use. TEXT Chapter 5, pp.183-226
Dr. Dupont-Versteegden
- Nov 5. Draft of research paper due. Skeletal muscle response to injury. TEXT Chapter 6, pp.229-268 **Dr. Butterfield**
- Nov 7. Skeletal muscle response to injury. TEXT Chapter 6, pp.229-268 **Dr. Cooper**
- Nov 12 Current research in areas of muscle biology. TEXT supplemental material.
Dr. Dupont-Versteegden
- Nov 14. Guest lectures. Clinical research. TEXT supplemental material.
- Nov 19. Student presentations
- Nov 21. Student presentations
- Dec. 3. Student presentations. Review for final exam
- Dec 12. **Final, Exam 3 at 3:00 PM-5:00 PM (comprehensive exam over course material)**

Course Description:

This course examines the gross as well as microscopic structural properties and the physiological function of skeletal muscle. Students will gain in-depth knowledge about not only normal muscle function, but also about the adaptability and plasticity of skeletal muscle under different environmental circumstances. The structure and function of skeletal muscle as it relates to human health-related issues will be examined and discussed.

Student Learning Outcomes

By the end of this course, students should be able to:

1. Have a conceptual understanding of muscle structure and function and limitations that are shaped by their evolutionary history as assessed by examination.
2. Understand the physiological function of muscles
3. Illustrate how muscles can be studied experimentally
4. Critically analyze research papers in the field of muscle biology
5. Discuss and develop new ideas and suggest future research directions in the field of muscle biology.

Course goals/objectives

The goals of this course are that the learning outcomes will be met by the students

Course Requirements: The course will be a mix of lecture and student-led discussion. Readings will be taken from the text and from the primary research literature. The instructors will provide greater detail on the term paper, but basically a student will read recent primary research papers on one subject and will explain their meaning and how the topics relates the field in muscle biology.

Grading:

Research paper:

First draft- **25 pts**

Final version -**100 pts**

Class participation (questions in class, paper discussions, online discussions)- **25 pts**
EXAMS- 100 pts each = **300 pts**

Outline of a primary research article or research of a muscle disease or comparative muscle review (<500 word article for the public, i.e. newspaper or magazine)- **10 points**

Oral presentation (ppt file or some sort of effective means of communicating the content) - **20 points**. This will be a individual assignment of presenting the research paper that one has chosen to write about. This will be a 7 minute class room presentation with 3 minutes of question time to follow. The presentation will be towards the end of the course. Student participation in the question period is encouraged.

Students will be provided with a Midterm Evaluation (by the midterm date) of course performance based on criteria in syllabus

Final grades will be based on total points earned and will be assigned as follows:

- A = 90 - 100 %
- B = 80 – 89.99 %
- C = 70 – 79.99 %
- D = 60 – 69.99 %
- E = less than 60 %

Writing assignments for course

Short newspaper type report: Write a <500 word article for the public, i.e. newspaper or magazine

Review article/term paper: There will be one formal manuscript write-up due this semester. The manuscript is intended to mimic the review manuscript writing and submission processes required for scientific publication and it will utilize results from reviewing scientific literature. The manuscript must be written independently (no group submissions). The draft and final submission dates are listed above in class schedule. The writing format described by the Journal of Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology will be used or Annual Reviews in Physiology. As an example, go to the journal's web page and look up information for authors at:

http://www.elsevier.com/wps/find/journaldescription.cws_home/525464/description

The “guide to authors” provided by the journal provides the formatting guidelines that must be followed for this assignment. Additional information for this assignment will be made available through the course website.

Office hours: Course Director has an open door policy, so feel free to stop by the office any time to ask questions, or to clarify something from class or the reading materials. However, when otherwise occupied a meeting should be set up. All other instructors are available by appointment also. It might be useful to form study groups and study together regularly and formulate questions early.

About the exams: The exams will allow you to demonstrate your understanding of the material presented in class and in the textbook. Each exam will last 60 min and will involve short answers of a few sentences and/or diagrams and/or multiple choice questions and/or essay questions. Make-up quizzes are given only in cases that are documented by a medical excuse, and by notification of the instructor *before administration* of the exam. Unexcused absence from an exam or failure to notify the instructor prior to the quiz will result in a score of zero for that exam. All make-up quizzes must be completed within one week of the scheduled exam date. Missing more than one quiz will result in a failing grade.

A grade of incomplete (INC) can only be given if a *major* portion of the course has been completed at a *passable* level. An INC grade will not be given for poor performance or

for lack of attendance. Documentation is required to justify a grade of INC. See the University catalog or schedule of classes for information on withdrawal from the course.

Blackboard/Class Communications

Course announcements, assignments, lecture outlines and additional materials will be posted online using Blackboard. Exams and homework dates will remain fixed. Updates to this syllabus (regarding topics and reading) will be posted; please check periodically. You will also receive important course announcements via your UK e-mail account. If you do not use your UK e-mail account, you need to activate it. It is strongly recommended that you check your e-mail regularly. Instructors may send messages—sometimes with attachments—to the class using this medium. You should also feel free to e-mail instructors if you have any questions or problems. Feel free to call Dr. Dupont-Versteegden as well, if you prefer a more personal communication or set up an appointment.

Disabilities

If you have a documented disability that requires academic accommodations, please see instructors as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Excused Absences

Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy. With an excused absence the instructors will try to provide an ECHO360 or a podcast recording for the student.

Verification of Absences

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request “appropriate

verification” when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

Academic Integrity:

You must abide by UK’s Code of Conduct

(<http://www.uky.edu/StudentAffairs/Code/index.html>), which prohibits:

1. Academic dishonesty and impropriety, including plagiarism and academic cheating.
2. Interfering or attempting to interfere with or disrupting the conduct of classes or any other normal or regular activities of the University.

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of *Student Rights and Responsibilities* (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else’s work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student’s assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put

quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.