

Course Syllabus

Course	<i>Skeletal Muscle Structure, Function, and Plasticity, HPHY 413/513</i>
Meets:	<i>Tuesday and Thursday. 5:00-6:20 PM</i>
Instructor:	<i>Hans C. Dreyer, PT, PhD</i>
Office:	<i>Center for Medical Education & Research 722 E. 11th Street, Eugene, OR</i>
Office Hours:	<i>by appointment</i>
Phone:	<i>541-346-5775</i>
Email:	<i>hcdreyer@uoregon.edu</i>
Text:	Selected chapters from: <i>Skeletal Muscle Structure, Function, and Plasticity; The Physiological Basis of Rehabilitation. 3rd Ed. Richard L. Leiber</i>
PDFs:	<i>Selected Journal Articles and Review papers</i>

Course overview: This course will focus on basic and applied muscle physiology and provide the structure and foundation for Muscle Cell Metabolism (HPHY 414) offered in the Spring. The course will cover critical topics in current muscle physiology based on background information from a book, *Skeletal Muscle Structure, Function, and Plasticity*, and in depth review articles and primary research papers during the second half of the term. The course is designed to increase students' breadth of knowledge and to develop an appreciation for the dynamic nature of muscle biology and physiology integrating structural change with functional outcomes. The course will also help students develop skills in reading primary research papers, critically evaluating data, formulating hypotheses, and extrapolation to clinical cases. Due to the pace of this course, students should have completed (HPHY 371) before attempting muscle structure & function.

Course Schedule:

Week 1:	Topic: Skeletal Muscle Anatomy Readings: 1) Chapter 1: Skeletal Muscle Anatomy. 2) Review paper and/or Primary paper(s)
Week 2:	Topic: Skeletal Muscle Anatomy & Physiology Readings: 1) Chapter 1: Skeletal Muscle Anatomy. 2) Chapter 2: Skeletal Muscle Physiology. 3) Review paper and/or Primary paper(s)
Week 3:	Topic: Skeletal Muscle Physiology & The Production of Movement Readings: 1) Chapter 2: Skeletal Muscle Physiology. 2) Review paper and/or Primary paper(s) 3) Chapter 3: The Production of Movement. 4) Review paper and/or Primary paper(s)
Week 4:	Topic: The Production of Movement, Exam 1 (Thursday) Readings: 1) Chapter 3: The Production of Movement. 2) Review paper and/or Primary paper(s)
Exam #1:	Mid-term Examination #1, Thursday (tentative) of week 4
Week 5:	Topic: Skeletal Muscle Adaptation to Increased Use Readings: 1) Chapter 4: Skeletal Muscle Adaptation to Increased Use. 2) Review paper and/or Primary paper(s)
Week 6:	Topic: Skeletal Muscle Adaptation to Increased & Decreased Use Readings: 1) Chapter 4: Skeletal Muscle Adaptation to Increased Use. 2) Review paper and/or Primary paper(s) 3) Chapter 5: Skeletal Muscle Adaptation to Decreased Use. 4) Review paper and/or Primary paper(s)
Week 7:	Topic: Skeletal Muscle Adaptation to Decreased Use, Exam 2 (Thursday), Readings: 1) Chapter 5: Skeletal Muscle Adaptation to Decreased Use. 2) Review paper and/or Primary paper(s)
Exam #2:	Mid-term Examination #2, Thursday (tentative) of week 7
Week 8:	Topic: Skeletal Muscle Response to Injury Readings: 1) Chapter 6: Skeletal Muscle Response to Injury. 2) Review paper and/or Primary paper(s)
Week 9:	Topic: Skeletal Muscle Response to Injury & Presentations Readings: 1) Chapter 6: Skeletal Muscle Response to Injury. 2) Review paper and/or Primary paper(s) Topic: Special topics & presentation(s)
Week 10:	Topic: Special topics & presentation(s)
Final:	Final Examination (cumulative)

Learning Objectives by Chapter
Chapter 1
To understand the basic components of a muscle cell
To understand the anatomy of a satellite cell
To understand the filament lattice structure of a muscle cell and how that results in the striation pattern
To understand the significance of whole muscle cellular organization -- architecture
To be familiar with the basic developmental process of skeletal muscle
To understand structural differences between muscle fiber types
Chapter 2
To understand the structures involved in excitation-contraction (EC) coupling along with their physical relationships
To understand the underlying events giving rise to the force-frequency relationship in skeletal muscle
To understand the structural basis for the length-tension relationship
To be able to describe the way in which muscle force depends on velocity
To understand motor unit structure-function
To be able to describe structural and functional difference among fiber types
To be able to describe possible causes of muscle fatigue
To understand the physiological basis of the electromyogram (EMG) and limitations of EMG interpretation
Chapter 3
To be able to define stress and strain as it applies to biological tissues
To be able to define moment in terms of force and moment arm
To be able to define the relationship between anatomical structures and the joint moment
To be able to define and distinguish among the terms strength, torque, force, and moment
To be able to define and state the significance of muscle-tendon interaction
To be able to define and state the significance of muscle-joint interaction
To be able to name the major 'design' parameters of the musculoskeletal system and the functional parameter that they affect
Chapter 4
To be able to describe the basic experimental "models" of adaptation to increased use
To be able to explain the strengths and weaknesses of each model in its ability to provide an understanding of adaptation to increased use

Learning Objectives by Chapter
To be able to define the factors that cause adaptation to increased use
To provide clinical examples that parallel the experimental models of increased use
To be able to predict changes in muscles which occur after experimental and clinical examples of increased use
Chapter 5
Describe the basic experimental "models" of adaptation to decreased use
Explain the strengths and weaknesses of each model in its ability to provide an understanding of adaptation to decreased use
Define the factors that cause adaptation to decreased use
Provide clinical examples that parallel the experimental models of decreased use
Predict changes in muscles which occur after experimental and clinical examples of decreased use
Chapter 6
Describe the anatomical location and developmental origin of the muscle satellite cell
Describe the basic morphological events in the muscle cell degeneration and regeneration events
Describe the eccentric injury model in terms of muscle physiology and human performance
Discuss proposed mechanisms of eccentric injury along with their clinical relevance

Grading policy

Undergrad Students

UG Assessment type	% of grade	UG Description
Participation	10	Instructor's perception of engagement in discussions
Quiz (weekly)	20	Weekly quiz (Tuesdays) on all prior content
Midterm written exam (x2)	20	In-class exam, closed book
Final written exam	20	In-class exam, closed book
Presentation	10	Oral presentation
TOTAL	100	

Graduate Students

G Assessment type	% of grade	G Description
Participation	10	Instructor's perception of engagement in discussions
Quiz (weekly)	20	Weekly quiz (Tuesdays) on all prior content
Midterm written exam (x2)	20	In-class exam, closed book
Final written exam	20	In-class exam, closed book
Presentation	10	Oral presentation & R21 style grant proposal
TOTAL	100	

Final letter grade assignment will be based on the following percentages of total available points:

A ≥ 94; A- ≥ 90; B+ ≥ 87; B ≥ 84; B- ≥ 80; C+ ≥ 77; C ≥ 74; C- ≥ 70; D+ ≥ 67; D ≥ 64; D- ≥ 60; F < 60.

If the overall class average falls below 80%, or if the highest score in the class falls below 94%, these grade assignments may be adjusted at the instructor's discretion.

Undergraduate students who choose the pass/no pass grading option must earn a grade of C- or better to pass the course; graduate students must earn a B- or better to pass.

Students with disabilities: The University of Oregon is working to create inclusive learning environments. Please notify us if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also contact Disability Services at 346-1155 or disabsrv@uoregon.edu

Student Conduct: Academic Misconduct, Plagiarism, and Cheating: Academic Misconduct, Plagiarism, and Cheating (as defined below) and other forms of academic misconduct are not permitted. If academic misconduct, plagiarism or cheating are suspected, you will earn an F in

the class, and the Office of the Dean for Students will be contacted. Please read the following quotation, which originates from the [Office of the Dean of Students](#).

- 1) (“Academic Misconduct” means the violation of university policies involving academic integrity. Examples include, but are not limited to:
 - a. Intentional tampering with grades, resubmitting assignments for more than one class without the permission of the professor; and
 - b. Intentionally taking part in obtaining or distributing any part of a test that has not been administered;
 - c. Cheating, as defined in OAR571-021-0105(3);
 - d. Plagiarism, as defined in OAR571-021-0105(26);
 - e. Knowingly furnishing false information to a University Official; and
 - f. Fabrication, as defined in OAR571-021-0105(14).
- 2) “Cheating” means any act of deception by which a student misrepresents or misleadingly demonstrates that he or she has mastered information on an academic exercise that he or she has not mastered. Examples include but are not limited to:
 - a. Giving or receiving unauthorized help in an academic exercise;
 - b. Use of sources or resources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;
 - c. Acquisition, without permission, of tests or other academic material belonging to a member of the University faculty or staff; and
 - d. Engaging in any behavior specifically prohibited by a faculty member in the course syllabus or class discussion.
- 3) “Fabrication” means the intentional use of information that the author has invented when he or she states or implies otherwise, or the falsification of research or other findings with the intent to deceive.
- 4) “Plagiarism” means using the ideas or writings of another as one’s own. It includes, but is not limited to:
 - a. The use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgement; and
 - b. The unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.”

Accessible Education: The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in disability related barriers to your participation, please notify me as soon as possible. You are also encouraged to contact the **Accessible Education Center** in 164 Oregon Hall:

Phone: 541.346.1155

Fax: 541.346.6013

General Inquiries: uoaec@uoregon.edu

Alternative Testing: aectesting@uoregon.edu