KSS 5270, Neuromuscular Exercise Physiology, 3 credit hours

Syllabus for Fall 2016

Instructor: Jake Emmett, Ph.D.

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Office Hours: 10-11:00 Mon & Wed, 9-10:00 Tue, & Thu., or by appointment.

Catalog Course Description: This course examines the effects of acute and chronic exercise, including various types of strength and conditioning programs, on the function of the neuromuscular system in various populations (e.g. health, women, elderly disease, etc.)

Objectives:

1. Develop an understanding of neuromuscular function during acute exercise with an in depth analysis of neuromuscular function at the cellular level, including but not be limited to, action potentials and the sliding filament theory.
2. Develop an understanding of the factors that contribute to muscle fatigue and muscle soreness from exercise.
3. Understand the factors that contribute to acute muscle force production.
4. Understand how neuromuscular function influences resistance training principles.
5. Identify the various adaptations to the neuromuscular that result from chronic resistance training.
6. Develop an understanding of how resistance training principles vary for women, older adults, and other populations.
7. Identify how certain neurological and muscular diseases can be modified or influence through a neuromuscular training program.
8. Understand how neuromuscular factors contribute to flexibility and range of motion of the joints.

Course Material (Provided to the students through D2L)

- Chapters from Farrell, P., Joyner, M., and Caiozzo, V. (Eds.). (2012) *ACSM Advanced Exercise Physiology.*
- Chapters from Fox, *Human Physiology,* (2012). McGraw-Hill: Boston, MA
- Various research and review articles.

Course Outline and Schedule (tentative):

The Nervous System and Exercise [3 weeks]

Human Physiology by Fox (Chapter 7)

1. Neurons and Supporting Cells (pages 152-158)
    1. Neurilemma and myelin sheath
    2. Functions of astrocytes and the blood brain barrier
2. Electrical Activity in Axons (pages 160-167)
    1. ion gating
    2. action potentials
    3. conduction of nerve impulses
3. Synaptic integration (pages 182-183)

Skeletal Muscle Physiology [4 weeks]

Human Physiology by Fox (Chapter 12)

4. Structure of Skeletal Muscle
5. Mechanisms of Skeletal Muscle Contraction
    1. Activation/excitation
    2. Sliding filament theory
    3. Types of muscle contractions
6. Acute Responses to Muscle Contraction
    1. Tension relationships
    2. Muscle fatigue
    3. Muscle damage and repair

Acute Force Production

7. Types of contraction
8. Muscle twitch
9. Force generation factors
10. Motor unit activation and recruitment
11. Muscle fiber types

Neural Adaptations [2 weeks]

Articles by Duchateau (2006) and Gabriel, (2006)

10. Neural Adaptations
    1. Motor Units and Coding Rate
    2. Synchronization
    3. Coordination between Muscle Groups
    4. Reciprocal Inhibition

Muscular Hypertrophy and Other Adaptations [6 weeks]

Articles:

11. Muscle Hypertrophy
    1. Phillips (2009)
    2. Schoenfeld (2010)
    3. Wang (2012)
    4. [Fluck (2006)]
12. Other articles

(Note: schedule subject to change)

Assignments:

Exams (50 points). Essay, in class.

Review paper (50 points)

Quizzes (10 points)

Assignments (5-20 points)

Grading Policy:

A ≤ 90% of total points

B 80-89% of total points

C 70-79% of total points

D 60-69% of total points

F < 60% of total points

Course Policies:

General Class Information/Policies:

- Success in this class requires regular and consistent study and review of the material covered in the textbook and in class discussions. It is expected that students come to class prepared to contribute to the class discussion. No extra credit is offered in this class.
- D2L is incorporated in this class in the following ways; access to Power Point presentations, online exams, online assignments, grade book, etc. If you have any questions regarding the use of D2L, please ask the instructor. Technical questions regarding D2L should be directed to the ITS Help Desk itshelp@eiu.edu or 217-581-4357
- **Academic integrity -** Students are expected to maintain principles of academic integrity and conduct as defined in EIU's Code of Conduct (http://www.eiu.edu/judicial/studentconductcode.php). Violations will be reported to the Office of Student Standards.
- **Students with disabilities -** If you are a student with a documented disability in need of accommodations to fully participate in this class, please contact the Office of Student Disability Services (OSDS). All accommodations must be approved through OSDS. Please stop by Ninth Street Hall, Room 2006, or call 217-581-6583 to make an appointment.
- **The Student Success Center** - Students who are having difficulty achieving their academic goals are encouraged to contact the Student Success Center (www.eiu.edu/~success) for assistance with time management, test taking, note taking, avoiding procrastination, setting goals, and other skills to support academic achievement. The Student Success Center provides individualized consultations. To make an appointment, call 217-581-6696, or go to 9th Street Hall, Room 1302.