KNES 689F – NEUROMECHANICS OF MUSCLE

DATE & TIME: Lectures – Tuesday 5-7:45 pm (SPH 0124)
CREDIT HOURS: 3
PREREQUISITES: None
INSTRUCTORS:
Dr. Espen Spangenberg  espen@umd.edu  5-2483  SPH 2134A
Dr. Jae Shim  jkshim@umd.edu  5-2492  SPH 0110F
Dr. Tim Kiemel  kiemel@umd.edu  5-2488  SPH 2339
Dr. John Jeka  jjeka@umd.edu  5-2512  SPH 2357
OFFICE HOURS: by appointment

COURSE DESCRIPTION
The course will provide an overview of four areas related to muscle function: 1) molecular basis of force generation; 2) muscle mechanics; 3) muscle modeling; and 4) neuromuscular control.

GOALS AND MEASURABLE OBJECTIVES
By the end of the course, students will have a working knowledge of:
1. Muscular force generation
2. Muscle mechanics
3. Neuromuscular control
4. Muscle models

Required Texts

Additional Readings - assigned on a weekly basis

READING AND EXAMINATION SCHEDULE

CELLULAR BASIS OF FORCE GENERATION (SPANGENBERG)

January 26  Snow day

February 2  Skeletal muscle structure and function
February 9  Excitation-contraction Coupling and Fatigue
February 16 - Other factors that affect muscle force production

MUSCLE MECHANICS (SHIM)

February 23  Viscoelastic properties of muscles
March 3  Muscle mechanics and energetics
March 10  Muscle force and injuries
March 16-20 – Spring Break

March 24 – **Force-length lab**

March 31 – Modeling: Hill, Huxley models (Kiemel)

**April 7** - Midterm – Concrete knowledge test

**NEUROMUSCULAR CONTROL (JEKA)**

April 14 – Neural Control

April 21 – Muscle Synergies

April 28 - Modeling – System ID (Kiemel)

May 5 - EMG lab

May 12 – TBA

**GRADING PROCEDURE**

**Participation** (10%)

**Labs** (30%)

**Midterm exam** (35%)
All students are responsible for all articles on the syllabus as well as any additional assigned articles up to the date of the exam.

**Final Project** (%25)

**ACCOMMODATIONS FOR STUDENTS WITH SPECIAL NEEDS**
The University has a legal obligation to provide appropriate accommodations for students with special needs (permanent or temporary, physical or mental). If you have a documented special need and wish to discuss academic accommodations, please contact me as soon as possible.

**ACADEMIC INTEGRITY**
Along with certain rights, students also have the responsibility to behave honorably in an academic environment. The **Code of Academic Integrity** will be strictly enforced. This policy is available on the web at [www.inform.umd.edu/jpo](http://www.inform.umd.edu/jpo). Among other things, the Code prohibits students from cheating on exams, facilitating academic dishonesty, plagiarizing in any form, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures.
Any suspected abridgement of these standards will be directly referred to the Associate Chair of the Department and forwarded to the University’s Office of Judicial Affairs. Confirmation of such incidence can result in expulsion from the University.
RELIGIOUS OBSERVANCES
The University of Maryland System policy provides that students *should not be penalized* because of observances of their religious beliefs; students should be given an opportunity, whenever feasible, to make up, with a reasonable time, any academic assignment that is missed due to individual participation in religious observances. *It is the student’s responsibility to inform the instructor of any intended absences for religious observance in advance, preferably within the first week of the semester.*