PCB 5785
BIOLOGY OF MUSCLE
SPRING, 2006

INSTRUCTOR:

Tim Moerland
208 Biology Unit 1 and 204 Conradi
644-6479 (Unit 1) and 644-4424 (Conradi)
moerland@bio.fsu.edu

CLASS MEETINGS:

Tuesday, Thursday 11:00-12:15
208 Biology Unit 1

COURSE OBJECTIVES:

This one-semester course is designed to provide an overview of muscle biochemistry, biophysics, and physiology. Coverage includes history, experimental methods, and the variability of muscular systems.

LEVEL:

Graduates; advanced undergraduates by approval.

PREREQUISITES:

At least one course in physiology (mammalian, cell, vertebrate, or comparative) is required. A course in biochemistry is recommended.

TEXT AND READINGS:

Readings for class will come from the original literature. No textbooks are required, but I can recommend the following for general reference, background information, and as worthwhile additions to your personal library.

McMahon's *Muscles, Reflexes, and Locomotion* (1984). It's wearing its age well – a good primer and especially useful for those interested in kinematics and biomechanics.

Vogel's *Prime Mover: A Natural History of Muscle* (2001). Written in non-specialist language and quite good. It has a very nice historical overview of muscle biology, as well as some excellent natural history vignettes and interesting analyses of man-tool interfaces.

Howard's *Mechanics of Motor Proteins and the Cytoskeleton* (2001). A superb treatment of biophysics and mechanics of actomyosin and other contractile systems. Highly recommended for those with interests in biophysics and molecular mechanics.

Bagshaw's *Muscle Contraction 2nd Edition* (1993). An excellent primer on the timeless elements of muscle physiology, biochemistry and mechanics. Unfortunately it's out of print, but used copies are often listed on Amazon, Alibris, and so on. If you can find a reasonably priced copy, buy it!

Perry's *Molecular Mechanisms in Striated Muscle* (1996). Another useful primer, but focused more at the molecular level than Bagshaw. Inexpensive and readily available from Amazon, Alibris, etc.

GRADES:

Grades for PCB5937 will be based upon your performance on four items:
(1) A take-home exam (issued Feb 23, due March 2),
(2) a paper (due April 4)
(3) a presentation, and
(3) a final examination. The time and format of the final exam will be announced.

Each of these items is worth 25% of your earned course grade. The +/- system will be used. Cut-off scores for course grades are: 92.5%=A, 90%=A-, 87.5%=B+, 82.5%=B, 80%=B-, 77.5%=C+, 72.5%=C, 70%=C-, 67.5%=D+, 62.5%=D, 60%=D-, less than 60%=F.

PAPER AND PRESENTATION:

The basic idea is for you to independently investigate a (muscle related) topic, prepare a paper on it, and then present a synopsis of your findings in a formal presentation to the class. Together, these two items represent 50% of your course grade (see "grades").

The topic is one that you select, in consultation with me. You may choose from a list of suggested topics (the "house list"), or you may work on a topic of special interest to you. There's quite a bit of latitude in what you may choose, but there are some restrictions. Specifically, the subject of your own thesis or dissertation is not appropriate, nor are topics that duplicate other assignments from other classes, past or present. Topics that are *indirectly* related to your research *may* be acceptable under some circumstances. Bottom line: be sure to check with me *before* you begin serious research.

Key dates: Topics must be selected and approved no later than February 9. Papers are due April 4. Presentation dates are April 18 and 20. Your slot will be assigned at the February 9 class meeting.

The Paper: You should strive for a comprehensive, synthetic, and analytical overview of the topic you have selected. It should be written along the lines of an article that might appear in a review series (such as Physiological Reviews, the Annual Review of Physiology, or the Annual Review of Biophysics and Biomolecular Structure). I have in mind papers that are 5000-7000 words in length (roughly 10-15 printed pages) with illustrations and tables (as appropriate) and full citations. Of course, the paper is to be entirely in your own words. Organization and formatting of your paper should conform to the instructions for authors for the Annual Review of Physiology (http://www.the-aps.org/publications/prv/prvinfo.htm). Note that pre-formatted citation definitions for most bibliographic software programs (EndNote, Procite, etc.) are available via a link at this site.

The Presentation: Your goal is to give a polished, professional, and scientifically current presentation to the class on the topic of your paper. Most people will choose to do this with PowerPoint, or a similar presentation program. Target your presentation for ~ 30 minutes, but be aware that this may need to be modified slightly, depending on overall time constraints. Your grade for this assignment will be assigned by your peers and by me (details will be provided in class).

HONOR CODE:

As a member of this class and FSU, you are bound to the highest standards of academic integrity. Please refer to the Academic Honor Code of Florida State University, which can be found in your student handbook and http://www.fsu.edu/%7Edof/forms/honorpolicy.pdf . Please be aware that this is a "zero tolerance" class with regard to infractions of the Academic Honor Code.

INFORMATION FOR STUDENTS WITH DISABILITIES:

Students with disabilities needing academic accommodations should (1) register with and provide documentation to the Student Disability Resource Center (SDRC), and (2) bring a letter to the instructor from the SDRC indicating you need academic accommodations. This should be done within the first week of class.

This syllabus and other class materials are available in an alternative format upon request.

PCB 5785 -- The Biology of Muscle
Tuesday, Thursday 11:00 to 12:15 PM
208 BIO

Date			Topic
Jan	10	(T)	Organizational meeting
	12	(R)	Overview; Twitch & Tetanus
	17	(T)	Contractile Proteins - Biochemistry and Nomenclature
	19	(R)	Contraction - Early Models
	24	(T)	Contraction - Sliding Filaments: Huxley 1957
	26	(R)	Cross Bridges I - Solution biochemistry: Lymn & Taylor 1971
	31	(T)	Cross Bridges II - Dynamics (Dr. P.B. Chase)
Feb	2	(R)	Cross Bridges III - Dynamics cont'd. (Dr. P.B. Chase)
	7	(T)	Calcium Regulation I - Regulatory Proteins
	9	(R)	Calcium Regulation II - Mechanisms
			[Deadline: Select topic for paper and class presentation]
	14	(T)	Calcium Regulation III - Comparative
	16	(R)	Neural Control I - Motor Units
	21	(T)	Neural Control II - EC coupling
	23	(R)	Energetics I - History and Thermodynamics
			[Take-home exam issued]
	28	(T)	Energetics II - Metabolism
Mar	2	(R)	Energetics III - Metabolism (cont'd)
			[Take-home exam due 5:00 PM]
	7	(T)	**Spring Break - no classes**
	9	(R)	**Spring Break - no classes**
	14	(T)	Energetics IV - Myothermy and Energy Balance
	16	(R)	Energetics V - Working Muscles
	21	(T)	Fiber types - Schemes and Practice
	23	(R)	Genetics & Plasticity I - Development
	28	(T)	Genetics & Plasticity II - Development (cont'd)
	30	(R)	Genetics & Plasticity III – Specialization
Apr	4	(T)	**No class meeting** *[Paper due at 5:00 PM]*
	6	(R)	Genetics & Plasticity IV – Exercise
	11	(T)	Genetics & Plasticity V – Acclimation and Adaptation
	13	(R)	Genetics & Plasticity VI – Evolutionary Adaptation
	18	(T)	Presentations
	20	(R)	Presentations
	26-30		Finals Week *[Final Examination time and format to be announced]*.