

York University  
Kinesiology and Health Science  
Advanced Exercise Physiology: Muscle  
*Summer 2014*  
**KINE 4440 3.0**

**Objectives of the Course**

To further an understanding of selected, current and advanced topics in muscle exercise physiology through 1) lectures and 2) the reading and discussion of current research literature.

The topics covered in this course will be devoted to skeletal muscle. They will include: 1) gene expression and adaptation in response to acute exercise and recovery, as well as chronic muscle use (resistance and endurance training) and disuse, 2) mitochondrial biogenesis, 3) fiber types, 4) the neuromuscular junction and E-C coupling, 5) aspects of fatigue, 6) carbohydrate and lipid metabolism, and 7) apoptosis. The course emphasizes the cellular and molecular basis of physiology in these areas.

**Required References:** Course notebook and papers

**Additional references which can be helpful:**

1. Stocchi, V., P. DeFeo and D.A. Hood (Editors). Role of Physical Exercise in Preventing Disease and Improving the Quality of Life. Milan: Springer-Verlag Italia, 2007 (on reserve).
2. Magalhaes, J. and A. Ascensao (Editors). Muscle Plasticity: Advances in Biochemical and Physiological Research Kerala, India: Research Signpost, 2009.
3. Wagenmakers, A.J.M. (Ed.) Essays in Biochemistry. The Biochemical Basis of the Health Effects of Exercise. 42: 214 pp., 2006.
4. Applied Physiology Nutrition and Metabolism 34(3): 307-492, 2009 (International Biochemistry of Exercise Meeting, Guelph, Canada, 2009).
5. Boron, WF and EL Boulpaep. Medical Physiology, 2 Ed., Philadelphia: Saunders, 2009.
6. McComas, A. Skeletal Muscle: Form and Function, Champaign: Human Kinetics, 1996.
7. Leiber, R. Skeletal Muscle Structure and Function, 3 Ed., Baltimore, Wolters Kluwer, 2010.
8. Tiidus, PM (Ed.) Skeletal Muscle Damage and Repair. Champaign, IL: Human Kinetics, 2008.

**Prerequisite:** KINE 4010 3.0 (Exercise Physiology) or equivalent.

**Lectures:** Tues/Thurs 8:30-11:30, Room: **CLH-K**

**Instructor:** **David A. Hood, Ph.D.** (Course Director)  
Rm. 302 Farquharson, ext. 66640  
**E-mail:** [dhood@yorku.ca](mailto:dhood@yorku.ca)

**Teaching Assistant:** **Matt Crilly**  
Rm. 302 Farquharson  
**E-mail:** [crilly09@yorku.ca](mailto:crilly09@yorku.ca)

**STUDENT EVALUATION**

Quiz # 1	15%
Quiz # 2	20%
Discussion topic	15%
Paper presentation	20%
Final Exam	30%

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TOTAL 100%

<b>Tuesday</b>	<b>Thursday</b>
May 6 Introduction, NMJ (1)	May 8 E-C coupling, Signaling (2)
May 13 Fiber types (3)	May 15 Resistance training (4); <b>Quiz #1 (10:30-11:15, covering sessions 1-3)</b>
May 20 <b>Discussion topics</b> (5)	May 22 Metabolism (6)
May 27 Apoptosis, muscle atrophy (7);	May 29 <b>Lab Day</b> (8)
June 3 Metabolism (9) <b>Quiz #2 (10:30-11:15, covering sessions 4-7)</b>	June 5 Mitochondrial biogenesis (10)
June 10 <b>Papers # 1, 2, 3, 4</b> (11)	June 12 <b>Papers # 5, 6, 7, 8</b> (12)
<b>FINAL EXAM tentative dates are June 18-20 (Wed-Fri); Covers sessions 8-12</b>	

**May 30** is the date for dropping without academic penalty.

### Explanation of Assignments

1. **Quizzes / final exam:** - will be of the short-answer question variety. Quizzes will be 45 minutes in length. This means sentences, diagrams, graphs, fill-in types of questions. No long essay questions. Expect “applied” questions, not just direct recall of the material presented. The Quizzes will **not** be cumulative. **Material covered in the paper discussions** will be evaluated in Quiz # 2. **If you miss a Quiz, you will write a make-up quiz during the final exam period time, along with the final exam. The final exam will be 1½ hours in length (also, not cumulative, and of the same format).**

2. **Discussion topics:** -- A list of discussion topics will be circulated in class. You and your group members will be assigned a topic and you must teach the class about it in a manner which is relevant to Muscle Exercise Physiology over no more than 10 minutes (followed by 5 minutes for questions). The presentation must be done in Powerpoint. There are 3 parts to the project: **1)** a drawn powerpoint illustration (5%); **2)** an explanatory figure legend describing the figure and its relevance to the topic (5%); and **3)** the presentation (5%).

You must provide the class and the course director with a single page handout (one side: illustration, other side figure legend). You are expected to use and document at least 3 scientific journal resources (not general internet sites or textbooks) as sources of information. I expect you to draw the illustration yourself based on the references you provide (not cut and paste it from the source). You will be assessed on the **quality** of each aspect of the project: organization, clarity, drawing complexity, apparent effort, ability to teach the class about the topic, and its relevance to Muscle physiology and health. All members of the group will receive the same grade and all are expected to contribute equally, and attend the presentation.

3. **Paper presentation:**-- your group will present the Introduction, Methods, Results and Discussion of an assigned paper in detail over about 20 minutes, using a Powerpoint format. All members of the group are expected to participate verbally, and all will get the same grade, provided all are in attendance. Questions of, and discussion with, the group members will be interjected or will follow the presentation (10 mins). The presenting group must supply the class with a 1 page (single-sided) outline of the paper with the following items:

- a)** Title of the paper and reference along with the names of the presenters in the group; **b)** Rationale for the study (i.e. why did they do it); **c)** Experimental design (eg. T vs. UT subjects, animals, general protocol employed and list of main items measured); **d)** Main results; **e)** Main discussion points; **f)** Summary of what we as a class should learn from this paper (in no more than 5 points).

Your group **grade** will be based on your organization, clarity, completeness (i.e. did you hit the main/important points?), your ability to teach the class about the main take-home points of the paper, the quality of your handout, and your ability to answer questions. Equal participation among group members is expected.