

York University
Kinesiology and Health Science
Advanced Exercise Physiology: Muscle
Winter 2017
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) aging. 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. Gardiner, PF. Advanced Neuromuscular Exercise Physiology. Windsor: Human Kinetics, 2011.
3. Lieber, RL. Skeletal muscle structure, function and plasticity: The Physiological Basis of Rehabilitation (3rd ed). Baltimore: Lippincott Williams and Wilkins, 2010.
4. Tiidus, PM (Editor). Skeletal Muscle Damage and Repair. Windsor: Human Kinetics, 2008.
5. Goedecke, JH and Ojuka, EO. Diabetes and Physical Activity. Basel: Karger, 2014.
6. Wagenmakers, A.J.M. (Ed.) Essays in Biochemistry. The Biochemical Basis of the Health Effects of Exercise. 42: 214 pp., 2006.
7. Applied Physiology Nutrition and Metabolism 34(3): 307-492, 2009 (International Biochemistry of Exercise Meeting, Guelph, Canada, 2009).
8. McComas, A. Skeletal Muscle: Form and Function, Champaign: Human Kinetics, 1996.

Prerequisite:

KINE 4010 3.0 (Exercise Physiology) or equivalent.

Lectures:

Mon/Wed 8:30-9:45, Room: **Ross South 201**

Instructor:

David A. Hood, Ph.D. (Course Director)

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Teaching Assistant:

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STUDENT EVALUATION

Quiz # 1	20%
Quiz # 2	20%
Discussion topic	15%
Paper presentation	20%
Final Exam	25%

TOTAL 100%

If you miss a Quiz, you must provide appropriate documentation to avoid a grade of 0. Make-up quizzes will be held during the final exam period time, along with the final exam. The final exam will be 1½ hours in length.

WEEK #	<u>Mon</u>	<u>Tues</u>	<u>Wed</u>	<u>Comments</u>
2	Jan 9 Introduction		11	
3	16		18	
4	23		25 Disc Topics	
5	30 Disc Topics		Feb 1 Disc Topics	Last day to enrol with permission is Feb.1
6	Feb 6		8 Quiz #1	
7	13		15	
8	20		22	Reading Week
9	27		Mar 1	
10	6		8	
11	13 Quiz #2		15 Lab Day	Last day to drop without receiving a grade is Mar 10
12	20		22	
13	27		29 Papers	
14	Apr 3 Papers		5 Papers	

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 “thinking” questions, not just direct recall of the material presented. The Quizzes will **not** be cumulative. Material covered in the **Discussion Topics** will be evaluated in Quiz # 1. Attendance at all quizzes is mandatory.

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 physiology and health over no more than 15 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 (at least ½ page with references) describing the figure and its relevance to the topic (5%); and **3)** the presentation itself (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 Mitochondria. **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 (5-10 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.

Marks will be deducted from your group paper presentation (5% per person) if your group does not attend, and be on time for, the presentations of your colleagues. Attendance will be taken at 8:30 am on the presentation day.