Course Description:
The physiology of skeletal muscle will be investigated at the molecular level. Furthermore, the formation and regeneration processes of skeletal muscle will be studied. Signalling cascades involved in muscle training (resistance and endurance training) will be a major course focus.

Learning Objectives: By the end of this course, the students will:
- Understand the details of skeletal muscle structure, architecture, composition, and force production.
- Understand muscle bioenergetics and its integrated metabolic pathways.
- Understand the origin of skeletal muscle: embryological and adult myogenesis (contribution from satellite cells).
- Understand in detail, the acute and chronic adaptations that occur in response to training in the skeletal muscular system (signalling cascades for hypertrophy/atrophy and endurance).
- Understand the complex phenomenon of muscle fatigue and muscle damage associated with training.
- Practice effective communication and interpersonal skills (working groups, presentations, class discussions).

Textbooks:
Required:
1) Skeletal Muscle from Molecules to Movement, David Jones et al. (2004), Churchill Livingstone;
2) Custom Course Materials package available at the bookstore.

Strongly suggested if continuing to study muscle physiology: Skeletal Muscle: Form and Function, Brian MacIntosh et al. (2nd Edition), and Skeletal Muscle: from myogenesis to clinical relations – ebook (CH 1, 8, 9 & 10) (http://www.intechopen.com/books/skeletal-muscle-from-myogenesis-to-clinical-relations)

Other Resources:
Selected readings will be assigned in advance on Connect
Suggested books:
1. Skeletal Muscle Plasticity in Health and Disease (From Genes to Whole Muscle, Volume 2)
2. Skeletal Muscle Repair and Regeneration: Advances in Muscle Research (Volume 3). Edited by S. Schiaffino and T. Partridge
3. The Physiology of Training for High Performance by Duncan MacDougall and Digby Sale (2014)
Evaluation:
All of the following evaluation components must be completed to receive course credit.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Oral Presentation and Summary</td>
<td>20%</td>
</tr>
<tr>
<td>Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm examination (in class)</td>
<td>30%</td>
</tr>
<tr>
<td>Final examination (TBD)</td>
<td>40%</td>
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<td></td>
<td><strong>100%</strong></td>
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Written Examinations:
Each of the examinations (mid-term and final) will consist of multiple choice, short answer questions and long answer question (essay-like). The exams will be based on the textbook, course package, lecture and seminar content. Material presented by guest lecturers and peers is also testable (presentations).

Class Format:
Classes will be predominately lecture style; however, seminars during class times will be scheduled to work in small groups on assigned questions/activities. Lectures will include a combination of presentations by the instructor, videos, and class discussions. Individual exercises and small group work during lecture will be included to actively engage the students and promote critical thinking about the issues being dealt with in the course. Small working groups are strongly suggested to meet outside of class time to discuss and answer specific questions related to lecture content. Student presentations will occur intermittently throughout the term. Please refer to the class schedule for details.

Participation:
Your participation in this course will be evaluated based on your contributions to the online thread on Connect, your leadership in seminar discussions, your interpersonal skills, your inquisition of peer presentations, and your critical, positive contributions in class.

Important Dates:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date(s)</th>
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<tbody>
<tr>
<td>Classes begin/Our first class</td>
<td>Jan. 3rd 2018, Jan. 4th</td>
</tr>
<tr>
<td>Withdraw without a W and with a W</td>
<td>Before Jan. 17th and Jan 18-Feb 9th</td>
</tr>
<tr>
<td>UBC closed</td>
<td>Feb. 12th and Feb. 19-23rd, March 30th and April 2nd – no classes</td>
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<tr>
<td>Midterm examination</td>
<td>Feb. 15th in class</td>
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<tr>
<td>Last day of classes</td>
<td>April 6th 2018</td>
</tr>
<tr>
<td>Final examination period</td>
<td>April 10-25th inclusive. Saturdays are included in the exam schedule. <strong>Do not schedule holiday travel during this period.</strong></td>
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Course Content:

<table>
<thead>
<tr>
<th>Units covered</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle Development: fetal and adult myogenesis (satellite cells)</td>
<td>Weeks 1-3</td>
</tr>
<tr>
<td>Readings: chapter 5 from course package and journal articles (list on Connect)</td>
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</tr>
<tr>
<td>Muscle Basics – structure/architecture/function/metabolism</td>
<td>Weeks 4-6 (week 7 is reading break)</td>
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<tr>
<td>Readings: CH1-7 required textbook</td>
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</table>
Muscle Training: adaptations to resistance training and endurance exercise
(Atrophy/Hypertrophy models – molecular signaling and cascades)
Readings: 2 chapters from course package, and journal articles (list on Connect)

Fatigue and muscle damage/repair (fatigue, overtraining, muscle damage)
Readings: CH9-11 required textbook, 3 chapters from course package and
journal articles (list on Connect)

*Presentations are scheduled intermittently throughout the course

Student Oral Presentations:

Presentation topics are to be selected by the groups (4 students per group): however, Instructor approval is necessary. A list of potential topics is below but is not exclusive of other topics. Presentations will include a 20min talk followed by a 3-5 min question period (worth 15%). Evaluation process for the presentation will be discussed at a later date (rubric posted on Connect). A 2-3 page summary (not including references, 1000-1500 words) of the presentation (key concepts and highlights) is due on the presentation day – email summary and I will post it in Presentations folder on Connect for review (worth 5%). A thread will be created and the file can be added to the discussion board. Note: material presented and outlined in the summary is testable content in the midterm and final examinations.

List of Potential Topics for Student Presentations:
A) Clinical:
  - Muscle diseases: myopathies (Duschenne muscular dystrophy, etc), non-dystrophic myotonia, neuromyotonia (Isaac’s syndrome), fibromyalgia, polymyositis, rhabdomyolosis, mitochondrial dysfunction, Guillain Barre Syndrome
  - Metabolic muscular diseases: acid maltase deficiency, carnitine deficiency, carnitine palmityl transferase deficiency, Cori or Forbes disease, lactate dehydrogenase deficiency, myoadenylate deaminase deficiency, Tarui disease, phosphoglycerate mutase deficiency, McArdle disease and myophosphorylase deficiency
  - Diabetes: focus on the musculoskeletal system
  - GLUT-4 transporters
  - Cancer induced cachexia
  - Sarcopenia (aging) Sarcopenic obesity
  - Sepsis-induced muscle dysfunction
  - Chronic heart failure and the effects on the musculoskeletal system (CHF)

B) Nutrition, supplementation and drugs
  - Supplements for power athletes or endurance athletes (beta-alanine, creatine monohydrate, protein supplementation, L-glutamine, etc)
  - Pyruvate Supplementation
  - Vitamins and minerals for muscle repair or growth
  - Caffeine
  - Response to hormones and drugs
  - Calorie restriction and atrophy

C) Training
  - Hyperthermic Conditioning or Training with sauna use
  - Hypergravity Training

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-Complex training
-Oxidative Stress
-Delayed onset muscle soreness (DOMS)
-Exercise-induced muscle mitochondrial biogenesis in skeletal muscle
-Disuse (bed rest, casting, etc) and Immobilization (microgravity)

D) Genetics and epigenetics
-Genes associated with athletic performance (ACTN3, myostatin, ACE, GYS1, PPARD, NRF2, PGC-1 alpha, CK-MM, MLCK, IGF-1)
-Performance enhancing polymorphisms (PEPs)
-Genetic risk factors and muscle injuries

E) Therapeutic interventions
-Massage
-Contrast/ice baths
-Compression clothing
-Myofascial/trigger point release
-Ultrasound
-Muscle stimulators
-Electrical stimulation therapy (EMS)

Tentative presentation Schedule: this schedule may be altered if student enrolment changes

-January 25th (3 spots)
-February 8th (3 spots)
-March 1st (3 spots)
-March 20th (3 spots)
-April 3rd (2 spots) – if needed

Assessment and Evaluation tools:
Refer to Connect for assessment and evaluation tools/details that will be used in this course.

CLASS EXPECTATIONS

EMAIL
Questions through email are always welcome but please be aware that I might not be able to respond right away. It may take me up to 24hrs to respond to your email during the week and I don’t check my email on weekends. I teach several large classes, which means that I might not recall your name at first glance. So, please include your course name (i.e. KIN 462) in the subject line.

OFFICE HOURS
Some questions can be answered through email while others may have to be discussed in person. Just send me an email and we can always arrange a time to meet that works for both of us.

TECHNOLOGY IN THE CLASSROOM
Note taking on a laptop encourages verbatim transcription and students no longer process information in a way that is conducive to the give-and-take of a classroom discussion. Laptops also create the
temptation to surf the web, check e-mail, or instant message creating a much less engaged classroom. Laptops will be allowed in the classroom. However, please make sure that you are focused on what is happening in the classroom and engaged in the discussion. Cell phones, however, are not welcome in the classroom. Cell phones are not to be visible or used at any time, especially not during quizzes or exams. Phones should be turned off before entering the room and remain off for the duration of class. If there is an extenuating circumstance which requires the student to use the phone during class, kindly step out of the room. Students who use their phone during class time will be asked to put the phone away and may be asked to leave room.

CLASS NOTES
Class notes will be made available through the course website. Notes will be posted 24-hours prior to each class. Please keep in mind that these notes provide an overview of what will be covered and do not contain information related to discussions, in-class assignments, or detailed examples, which will be covered in class.

UNIVERSITY POLICIES
It is your responsibility to become familiar with the University of British Columbia’s Academic Honesty and Plagiarism Policies, as well as the Student Declaration and the consequences of violating these policies.

Important Information:
- Although attendance is not formally taken in class, regular attendance is encouraged. You are responsible for all material covered in class and any information given whether in attendance or not. You are also responsible for getting your own notes from class as well as information pertaining to changes in the course outline, readings, assignments, and information pertaining to any tests or exams.
- You are responsible for all announcements concerning changes in the course outline, readings, assignments, exams, and other matters made during class periods whether or not you are in attendance when announcements are made.
- Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes if missed more than a week of classes.
- Please note: Extensions will NOT be provided for academic workload or for any other reason. In case of a medical or serious family emergency an appropriate medical certificate must be submitted. Instructors are not required to make allowance for any missed test(s) that is/are not satisfactorily accounted for.
- Students absent from final examinations held in the official examination period must request academic concession from the office of the Director.
- Lectures will be developed with the textbook as the primary source and the additional assigned readings. Additional material will be commonly included (visual aids, diagrams, videos, etc), therefore attendance at lectures is recommended.
- Students should retain a copy of all submitted assignments (in case of loss) and should also retain all their marked assignments in case they wish to apply for a Review of Assigned Standing.
- Students have the right to view their marked examinations with their instructors, providing they apply to do so within a month of receiving their final grades. This review is for pedagogic purposes. The examination remains the property of the university.
- As a consequence of revised copyright rules with UBC, your faculty will no longer be able to provide copyrighted materials directly to you via course email, websites or Connect.
- Refer to the UBC Calendar for further details on University Academic Policies and regulations and grading practices.
Grade Scheme:
Grades will be assigned based on the following grading scheme. In all cases marks will be rounded to the nearest percent.
Percentage Letter Grade
90-100 A+
85-89 A
80-84 A-
76-79 B+
72-75 B
68-71 B-
64-67 C+
60-63 C
55-59 C-
50-54 D
0-49 F (Fail)

Academic Dishonesty and Plagiarism:
Plagiarism, cheating or any other form of academic dishonesty will not be tolerated. Violations will be taken seriously and will be dealt with according to the University policy regarding academic dishonesty (See Academic Calendar, http://www.students.ubc.ca/calendar/). Any transgression could result in failure of the course.

Course Review/Feedback:
The School of Kinesiology is continually trying to improve our teaching, and student opinion is an important factor, which influences this. At the end of the course every student should fill in a questionnaire (SCETs). This involves a set of predetermined questions to grade all aspects of the course, as well as the opportunity to add any written comments. Make sure you complete this questionnaire. Your opinion is valuable to us.

Note:
Education is a multidisciplinary field that brings together faculty, students and others from diverse academic and personal backgrounds. UBC’s Faculty of Education is committed to creating a respectful workplace and learning environment that supports inclusion based on the principles of equity, diversity and social justice in order to create an environment that supports its community members' full participation. The Faculty of Education is committed to providing accessible, usable, and welcoming spaces for faculty, staff, students, and visitors who have disabilities, are members of racialized communities, Indigenous, transgender, two-spirit and gender-diverse people, regardless of their age, sexual orientation, social status, religion, ethno-linguistic, nationality and/or citizenship status.

Faculty of Education courses take place in learning environments that are inclusive of gender identity, gender expression, sex, race, ethnicity, class, sexual orientation, ability, age, etc. Learners and educators expect to be treated respectfully at all times and in all interactions. Non-sexist, non-racist, non-homophobic, non-transphobic and non-heterosexist language is expected in Faculty of Education classes, course content, discussions and assignments.

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Please feel welcome to e-mail your instructor your name and pronoun and how you would like these to be used.