

**KINESIOLOGY/BIOLOGY 3010**  
**Physiology of Exercise I**  
**Fall 2019**



**Lakehead**  
UNIVERSITY

School of  
Kinesiology

Professor: Ian Newhouse  
Office: SB 1017  
Phone: 343-8074  
Email: [Ian.Newhouse@lakeheadu.ca](mailto:Ian.Newhouse@lakeheadu.ca)  
Office Hours: by appointment

Teaching Assistants:  
Samantha Morris ([smorri14@lakeheadu.ca](mailto:smorri14@lakeheadu.ca)),  
Courtney Kennedy ([cmkenned@Lakeheadu.ca](mailto:cmkenned@Lakeheadu.ca)),  
Matthew Neill ([mneill1@lakeheadu.ca](mailto:mneill1@lakeheadu.ca))  
4<sup>th</sup> yr student assistants:  
Elric Allison, Stephen Boulanger, Michael  
Coccimiglio, Laura Deschamps, Josh  
Gerolami, Stephanie Johnston

**TIMES:**

Lecture Times:

Tuesday, Thursday	5:30 – 7:00	RC 0005
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Lab Times:

F1 Wednesday (wk 1)	2:30 - 4:30	SB 1025
or F2 Friday (wk 1)	10:30 - 12:30	SB 1025
or F3 Wednesday (wk 1)	12:30 - 2:30	SB 1025
or F6 Wednesday (wk 2)	12:30 - 2:30	SB 1025

**CALENDAR DESCRIPTION:**

A study of principles of physiology as they apply to human movement. Topics discussed include: training principles, energy metabolism, characteristics of skeletal muscle, neurological aspects of human movement, muscle contraction and fatigue, respiration and circulation. Laboratory sessions expose students to the techniques used in measuring the energy systems.

Prerequisites: [Chemistry 1210](#), [Biology 2011](#), [2012](#) and [2030](#)

**COURSE FORMAT:**

Lecture and lab

**LEARNER OUTCOMES:**

At the conclusion of this course students will be able to:

- Explain the biochemical and physiological adaptations which occur in the human body to meet the acute and chronic demands of different types of exercise and work. Specifically they will be able to:
  - Apply the principles of training to a sport or rehabilitation setting
  - Explain, with various examples, how the body maintains homeostasis during both acute and chronic exercise
  - Discuss the biochemical pathways involved in aerobic and anaerobic energy production
  - Explain how exercise intensity and duration affect fuel selection

- Identify the site of release, stimulus for release and predominant action of various hormones, particularly in the context of exercise and training
- Discuss the general organization of the nervous system and how we control movement
- List the chain of events that occur during muscular contraction
- Provide an overview of the design and function of the respiratory and circulatory systems
- Integrate most of the physiological concepts discussed in this course
  - A) into a one page performance model for a sporting event of your choice
  - B) into an essay to explain where ATP comes from.

## EVALUATION:

<u>Item</u>	<u>Weighting</u>	<u>Due Date</u>
1. Lab write ups for labs 2-5	4X8%	Start of your next lab on D2L
2. Mid-term exam	25%	October 22
3. Reflection assignment	5%	October 31
4. Performance model	5%	November 21
5. Final exam	33%	TBA (Dec 5-15 period)

## REFLECTION ASSIGNMENT

Some background reading on this is provided under “reflective learning” on our D2L site. For this assignment, I would like you to critically reflect on how you did on the midterm in this course. My hope is that in doing this you will appreciate that critical inquiry into why you perform the way you do on an exam mirrors the way I would like you to critically inquire throughout the physiology course (i.e. always be asking why something causes something to happen). This will be similar to the performance model (see below) except it is applied to your midterm exam. Other objectives of the assignment are that it may improve your metacognitive abilities (i.e. your ability to analyze how you learn) which may lead to lessons learned on how best to prepare for subsequent exams. A final objective of this assignment is that it will allow me to find out what is working and what isn't.

As this is just a 5% assignment, my expectations are for a one page, single spaced, typed submission. Remember, as noted in the posted article, that a good critical reflection includes "(1) linking past, present, and future experience; (2) integrating cognitive and emotional experience; (3) considering the experience from multiple perspectives; (4) reframing; (5) stating the lessons learned; and (6) planning for future learning or behaviour." You should note that I will be the only one marking these assignments and information will be kept confidential. A marking rubric I will use is also in the D2L site.

## PERFORMANCE MODELS

This will become clearer as I will present a couple models in class. What I would like you to do is think of your own sport and try to depict on one piece of paper the numerous factors that contribute to a good performance (or conversely to a poor performance). You are free to pick just one skill within that sport (eg. doing a drive in golf), or assess the whole performance (eg. running a 10 mile road race). While all variables (psychological, environmental, tactical, equipment etc) can be noted, emphasis for our purposes will be on physiological variables.

While complicated, your model should also make an attempt at showing how some of these variables inter-relate.

**Late penalty:** For all assignments and labs there is a standard late penalty of 1% (of final grade) for each day late.

### **REQUIRED TEXT AND RESOURCES:**

Powers, S. K., & Howley, E. T. (2018). *Exercise physiology: Theory and application to fitness and performance* (10<sup>th</sup> ed.). New York, NY: McGraw-Hill Education.

Lab manual documents and other readings are all on the D2L site

### **LABORATORIES:**

Refer to the D2L site for detailed information.

**Participation** - Attendance at all scheduled labs is mandatory. Each unexcused absence (that is, without a medical or family emergency, will result in a 5% grade reduction for each absence). More than two unexcused absences will result in a grade of “incomplete” and the student will be required to retake this course. It is important for students to attend the lab section they are assigned to. If there are extenuating circumstances that require you to miss a lab, we will try to accommodate you in another lab section, but only if you notify the teaching assistant prior to your scheduled lab.

### **ADDITIONAL COURSE INFORMATION:**

The School of Kinesiology has adopted a series of policies that apply to all courses. Students are expected to be familiar with these policies and to abide by them. The course policy document may be found on the School of Kinesiology website at: <http://kinesiology.lakeheadu.ca/>.

Accommodations: Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations to ensure that students with disabilities have an equitable opportunity to participate in all of their academic activities. If you may need accommodations, please contact Student Accessibility Services (SAS – <http://studentaccessibility.lakeheadu.ca>) and register to access these services.

Courses offered by the School of Kinesiology address a number of the College of Kinesiologists of Ontario's entry-to-practice competencies. For more information on the competencies and becoming a registered Kinesiologist, visit the CKO website at [https://coko.ca/CKO\\_Public/Public\\_Content\\_Records/Apply\\_/Subcontent3/Study\\_Resources.aspx](https://coko.ca/CKO_Public/Public_Content_Records/Apply_/Subcontent3/Study_Resources.aspx)

### **DETAILED COURSE SCHEDULE:**

## LECTURE OUTLINE

Week 1	Introduction/Training Principles
Week 2	Control of the Internal Environment
Week 3	Bioenergetics
Week 4	Exercise Metabolism
Week 5	Hormonal Response to Exercise
Week 6	The Nervous System
Week 7	Skeletal Muscle
Week 8	Circulatory Response to Exercise
Week 9	Circulatory Response to Exercise
Week 10	Respiration During Exercise
Week 11	Performance Models
Week 12	Review

## CHAPTERS IN TEXT

NA (on D2L)
2
3
4
5
7
8
9
9
10
19

## SCHEDULE FOR THE LABORATORY EXPERIENCES:

### Two weeks starting September 11<sup>th</sup> Lab 1 - Baseline Measures

- Baseline measures in exercise physiology
  - measuring blood pressure
  - heart rate
  - body mass index (BMI)
  - waist to hip ratio
  - body fat percentage (fat calipers, bioelectrical impedance)
  - Rockport walk test

*Note that there is not a required write-up for this first lab*

### Two weeks starting September 25<sup>th</sup> Lab 2 – Strength Measures

- Strength measures in exercise physiology
  - partial curl-ups
  - right-angle push-ups
  - sit and reach flexibility test
  - handgrip strength test
  - Coopers 12-minute run test
  - Canadian Aerobic Fitness Test (Step Test)

### Two weeks starting October 9<sup>th</sup> Lab 3 – Measuring Maximal Oxygen Consumption (VO<sub>2</sub>Max)

- A demonstration of a VO<sub>2</sub>Max test → Bruce treadmill protocol
- A predictive VO<sub>2</sub>Max test → Leger 20m Shuttle Run test

### Two weeks starting October 30<sup>th</sup> Lab 4 – Measuring Anaerobic Power

- A demonstration of a maximal anaerobic power test → Wingate bike test
- Two anaerobic field tests → the Margaria-Kalamen Power test
  - Vertical Jump test.

### Two weeks starting November 13<sup>th</sup> Lab 5 – Measuring Exercise Stress

- Measuring exercise stress on the lower and upper body by completing two exercise tests
  - Cycle Ergometer—Astrand Rhythmic Nomogram approach
  - Arm Crank Ergometer—Modified Astrand Rhythmic approach for arm work

*Note that this final lab write up will be submitted to your TA two weeks after the lab.*