KINESIOLOGY/BIOLOGY 3010
Physiology of Exercise I
Fall 2024

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TIMES:

Lecture Times:
Tuesday/Thursday 8:30 – 10:00 UC 0050

Lab Times:

	Time	Room	Lab #1	Lab #2	Lab #3	Lab #4	Lab #5
F1 Wednesday	2:30 - 4:30	SB 1025	Sept 11	Sept 25	Oct 9	Oct 30	Nov 13
F2 Tuesday	10:30 - 12:30	SB 1025	Sept 10	Sept 24	Oct 8	Oct 29	Nov 12
F5 Tuesday	10:30 - 12:30	SB 1025	Sept 17	Oct 1	Oct 22	Nov 5	Nov 19

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:

Item	Weighting	Due Date
1. Lab write ups for labs 2-5	4X8%	Start of your next lab on D2L
2. Mid-term exam	25%	October 24
3. Reflection assignment	5%	November 5
4. Performance model	5%	November 26
5. Final exam	33%	TBA (Dec 6-16 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.

EXAMS

Both the midterm and final will be short answer in-person exams.

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. & Quindry J. (2021). *Exercise physiology: Theory and application to fitness and performance* (11th 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.

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:
https://www.lakeheadu.ca/academics/departments/kinesiology/regulations-and-policies

Generative artificial intelligence (Generative AI or GenAI) is a category of AI systems capable of generating text, images, or other media in response to prompts. These systems include ChatGPT and its variants Bing (built by OpenAI) and Bard (built by Google) among several others. Other generative AI models include artificial intelligence art systems such as Stable Diffusion, Midjourney, and DALL-E.

GenAI tools can provide valuable assistance and support in academic work. However, it is essential to use them responsibly and ethically. The following information and guidelines apply to the use of AI-based tools in this course:

- **a) Student Responsibility**
  - It is the responsibility of the student to understand the limitations of AI-based tools. While these tools can provide suggestions and insights, final decisions and critical thinking should come from the student's own understanding and effort. Before submitting, review your work with this in mind. If you don't understand what type of GenAI usage is appropriate, ask the course instructor for clarification.
- **b) Formative Usage**
  - In this class, you may use GenAI for formative, but not summative, work. That means it can be used as a "possibility engine" (brainstorm tool), a "study buddy," a "collaboration coach," a "guide on the side," a "personal tutor," a "co-designer," etc. to help you learn course content, but it cannot be used as the primary vehicle for any work that is submitted for marks or evaluation. (See UNESCO's "ChatGPT and Artificial Intelligence in Higher Education Quick Start Guide," page 9, for explanations and examples of these and other roles GenAI can productively serve in a formative capacity.)
- **c) Error & Bias**
  - AI content is created by computer algorithms that have been trained using large amounts of data. The AI learns from patterns and examples in the data to generate new content that resembles what it has been trained on. If the training data used to train the AI model is biased or limited in scope, the AI may reproduce content that is inaccurate, incomplete, offensive, and/or biased. Students should weigh this as they consider material produced by AI.
- **d) Trustworthiness**
  - Generative AI can be vulnerable to manipulation and misuse. It can be used to generate fake news, misinformation, or deepfake content, which can have harmful consequences. Students should check AI generated content against reputable sources.
- **e) Plagiarism**
  - Since [writing and critical thinking ability] are learning outcomes of this course, all work submitted for evaluation must be the student's original work. Using the work of others (including content curated/generated by AI) without proper citation is considered plagiarism. See "Citing Artificial Intelligence" for assistance with correct documentation.
- **f) Citation of Sources**
  - If you use material generated by an AI program for an assignment in this course, it must be cited like any other source (with due consideration for the quality of the source, which may be judged as poor). Failure to do so will be considered a violation of academic integrity. See Student Code of Conduct – Academic Integrity.

Supports for Students

There are many resources available to support students. These include but are not limited to:

- Health and Wellness
- Student Success Centre
- Student Accessibility Centre
- Library
- Lakehead International
- Indigenous Initiatives

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact Student Accessibility Services (SC0003, 343-8047 or sas@lakeheadu.ca)

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

DETAILED COURSE SCHEDULE:

LECTURE OUTLINE		**CHAPTERS IN TEXT**
Week 1	Introduction/Training Principles	NA (on D2L)
Week 2	Control of the Internal Environment	2
Week 3	Bioenergetics	3
Week 4	Exercise Metabolism	4
Week 5	Hormonal Response to Exercise	5
Week 6	The Nervous System	7
Week 7	Skeletal Muscle	8
Week 8	Circulatory Response to Exercise	9
Week 9	Circulatory Response to Exercise	9
Week 10	Respiration During Exercise	10
Week 11	Performance Models	19
Week 12	Review	

SCHEDULE FOR THE LABORATORY EXPERIENCES:

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

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)

Lab 3 – Measuring Maximal Oxygen Consumption (VO_2Max)

→ A demonstration of a VO_2Max test → Bruce treadmill protocol
→ A predictive VO_2Max test → Leger 20m Shuttle Run test

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.

Lab 5 – Measuring Exercise Stress

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

Note that this final lab write up will be submitted to D2L two weeks after the lab.