COURSE INFORMATION

Course Title	Course Code Number	Credit Value
PULMONARY PHYSIOLOGY OF EXERCISE	KIN 475	3

CONTACTS

Course Instructor(s)	Contact Details	Office Location	Office Hours
Bill Sheel, Ph.D.	bill.sheel@ubc.ca	Chan Gunn Pavilion, rm 221B	By appointment.

Office hours: I am available to meet an discuss course content. This can often be done immediately before or after a lecture. In the event that does not agree with your schedule please speak to me or email me to make an appointment.

Email: attempting to teach or explain material over e-mail can be difficult and ineffective. **If you have detailed questions about course material or concepts, those questions should be addressed in person.** Please seek clarification on course material in class, during breaks, after class, or during office hours with the instructor or teaching assistant. E-mail should be used for a limited number of reasons, including: scheduling a time to meet during office hours, in cases of emergency that may cause you to miss an exam, or situations otherwise detailed in class. It may take up to 24 hours to respond to your email during the week and **I do not check my email on weekends**, nor will your teaching assistant. Please keep this in mind around exam time. Please include "KIN 475" in the subject line of emails.

OTHER INSTRUCTIONAL STAFF

Teaching Assistants: (i) Joshua Taylor. Email will be distributed.

DESCRIPTION

The purpose of this course is to understand how is it is the lungs, chest wall, and ventilatory control mechanisms operate during dynamic whole-body exercise. Additional emphasis is placed on how it is the respiratory and cardiovascular systems interact during exercise. Different human models will be used to illustrate key physiological principles and provide context (i.e., application of physiology). For example, elite athletes, pulmonary disease (i.e., asthma, obstructive lung disease, lung transplant) and environmental hypoxia will be discussed. Third year standing is a prerequisite.

There are at least four major challenges to the respiratory system during exercise. This course examines how the human respiratory system is structured and regulated to meet these exercise requirements.

1. Increased muscle metabolism causes mixed venous oxygen content to fall to less than one-fifth of its resting value and the partial pressure of mixed venous carbon dioxide to double.
2. Cardiac output increases 5 to 6 times resting values, and because all of the cardiac output must go through the lungs all of the time, this poses substantial threats, not only to the time available in the pulmonary capillaries for gas exchange but also to the regulation of pulmonary vascular

resistance and capillary pressure and therefore to the containment of plasma water within the pulmonary vasculature.

3. Ventilatory requirements of 20 to 30 times that of rest must be met while the increase in mechanical work required for each breath is minimized. To these ends the medullary respiratory network must integrate a host of sensory feedback and feed-forward stimuli (a) to ensure that ventilation is driven precisely in proportion to metabolic requirements, and (b) to preserve precise synchronization of respiratory motor output to the upper airway and to the primary and accessory pump muscles of the chest and abdominal walls.
4. The work done by the locomotor muscles and the respiratory muscles increases several fold, and the blood flow requirements of both sets of these essential muscles must be met.

COURSE STRUCTURE

The course includes lectures, in-class discussions, tutorials and requires student participation

Canvas: Information about this course, lecture slides, and important reminders will be made available on the course website. This information can be accessed on Canvas, so please check the site regularly. *You are responsible for the information posted to Canvas.*

Readings:

- West J.B. Respiratory Physiology – The Essentials. 10th Edition
- Assigned readings available through UBC library electronic journals. It is expected that readings will be completed prior to the assigned class

You should attend all lectures. 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 related to assignments or exams. If you will not be in class due to travel for varsity sport (or other) you must email **BEFORE** any assessment takes place to notify us of your absence, and then provide documentation to the instructor.

SCHEDULE OF TOPICS

Sept 3. Imagine Day. No class.

Sept 5. Intro, "the course". challenges to the respiratory system during exercise

Sept 10. Structure and Function: how the architecture of the lung subserves its function. Text Ch. 1

Ventilation: how gas gets to the alveoli. Text Ch. 2

Sept 12. Ventilation: how gas gets to the alveoli. Text Ch. 2. and 'chalk talk'

Sept 17. Control of Ventilation: how gas exchange is regulated. Text Ch. 8

Sept 19. Control of Exercise Hyperpnea. Reading to be distributed.

Sept 24. Diffusion: how gas gets across the blood-gas barrier. Text Ch. 3

Sept 26. Blood Flow and Metabolism: how the pulmonary circulation removes gas from the lung and

alters some metabolites. Text Ch. 4

Oct 1. Ventilation-Perfusion Relationships: how matching of gas and blood determines gas exchange. Text Ch. 5

Oct 3. Gas Transport by the Blood: how gases are moved to the peripheral tissues. Text Ch. 6

Oct 8. Mechanics of Breathing: how the lung is supported and moved. Text Ch. 7

Oct 10. Integration of topics.

Oct 15. 5 minutes, 5 slides – logistics. Group work.

Oct 17. MIDTERM EXAMINATION

Oct 22. Disordered breathing in heart failure.

Oct 24. Respiratory influences on cardiovascular control.

Oct 29. Exercise induced arterial hypoxaemia.

Oct 31. Chronic Obstructive Pulmonary Disease (COPD).

Nov 5. Geese at altitude.

Nov 7. No Class.

Nov 12. Sex differences in the pulmonary physiology of exercise.

Nov 14. 5 minutes, 5 slides – presentations.

Nov 19. 5 minutes, 5 slides – presentations

Nov 21. Guest Lecture. TBD.

Nov 26. 5 minutes, 5 slides – presentations

Nov 28. Final exam review.

Dec 3-18. Final Exam Period. DO NOT SCHEDULE TRAVEL DURING THIS TIME.

ASSESSMENTS OF LEARNING

5 min/5 slides, article	15%
Midterm Examination	35%
Final Examination	50%

** The final examination is cumulative with a greater emphasis on material after the midterm. Content from the laboratory portion of the course is examinable.

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