

**Faculty of Health  
Kinesiology and Health Science**

**Course Instructor**

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**Course:** *HH/KINE 4453 3.0 – Vascular Function in Health and Disease*

**Course Webpage:** *moodle.yorku.ca*

**Term:** *Fall 2016*

**Prerequisite / Co-requisite:** *HH/KINE 4010 3.0 – Exercise Physiology*

**Evaluation \***

Midterm Examination, 35%

**Oct. 17, in class**

Written paper OR Oral presentation, 20%    **Nov. 23** (written)/Nov.2 to Nov.30 (oral)

Final Examination, 45%

*Nov. 11 is last drop day*

**\*Grading:** The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York. Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

***Organization of the Course -***

*The course involves 2 formal lectures per week.*

**Expanded Course Description**

Blood vessels play an integral role in the function of the cardiovascular function. The structure and function of blood vessels is dynamic, and can be modified by both positive and negative factors. This course will discuss the structure/function relationships of different types of blood vessels, and study the intracellular signalling pathways that regulate healthy blood vessel function. This knowledge will form the foundation to then inquire into the pathophysiological processes of inflammation, and the development of atherosclerosis and hypertension, which represent the most common types of disorders of the vascular system. The course will examine current research into the mechanisms underlying these diseases, and the potential positive cellular benefits of exercise as a preventative and therapeutic tool. Students will be required to read current research papers, and discussion of these findings will be conducted in class.

## **DETAILS OF TOPICS TO BE COVERED**

### **1) Vascular Structure and Function:**

- Review: Vascular network; types of blood vessels
- Cell biology of vascular smooth muscle and endothelium
- Signal pathways used to regulate blood flow - smooth muscle and endothelium

### **2) Influence of Exercise and Training on Vascular Structure/Function**

#### *a- Acute Response to Aerobic Exercise*

- Exercise Hyperemia -underlying mechanisms?
- Local and central regulation of blood flow
- Functional Sympatholysis

#### *b- Repeated Exercise Response*

- Blood pressure
- Vascular tone and responsiveness
- Vascular Remodelling

### **3) Inflammation**

- Immune cells involved
- Characteristics of an acute inflammatory response
- Regulation of vascular permeability
- Vascular adhesion proteins and lymphocyte transmigration
- Impact of exercise on the inflammatory response

### **4) Hypertension**

- Factors that induce hypertension
- Smooth muscle and endothelial cell contributions to hypertension
- Renin/Ang II signalling
- Impact of exercise on hypertension

### **5) Atherosclerosis / Restenosis**

- Overview: the process of plaque formation/rupture
- Causes: Lipid metabolism; inflammation; role of hemodynamics
- Mechanisms: alteration in cellular/molecular behaviour of endothelium; vascular smooth muscle; infiltrating inflammatory cells
- Treatments: methods of therapy; process of restenosis; impact of exercise

### **6) Peripheral Artery Disease**

- Overview: link to atherosclerosis; diabetes; hypertension
- Underlying pathology
- Treatments

## **COURSE LEARNING OBJECTIVES**

### **(1) Statement of the purpose:**

This course will provide an indepth study of the physiology of the vascular system. These concepts will be applied to understanding the pathophysiology of the vascular system in situations of chronic inflammation and diseases such atherosclerosis and hypertension. The beneficial effects of exercise on the vascular system will be discussed.

### **(2) Specific learning objectives of the course:**

*Students will be able to:*

- understand in detail the function of the vascular system at the cellular level.
- appreciate the switch from physiological to pathological function, and the development of several types of vascular diseases.
- engage in the discovery of current research in these topics.
- communicate research findings, using both oral and written formats.

### **(3) UUDLES covered in this course:**

#### *A) Depth and Breadth of Knowledge*

- Demonstrate knowledge of physiology terminology and nomenclature.
- Describe the complexity and diversity of the structure and function of the vascular system.
- Demonstrate a broad interdisciplinary knowledge of the importance of physical activity to health throughout the life cycle.
- Critically evaluate and discuss current issues relating to vascular physiology.
- Demonstrate a breadth and depth of knowledge in Kinesiology and Health Science in one or more specialized areas.

#### *B) Knowledge of Methodologies for Inquiry*

- Demonstrate a working knowledge of common computer applications appropriate for the task
- Prepare, interpret and present data using appropriate qualitative and quantitative methods
- Describe the process of research that is used to develop knowledge in the field.
- Evaluate information about physical activity and human health that is disseminated via popular media and discipline related research journals.

#### *C) Application of Knowledge*

- Apply multi-disciplinary knowledge of physical activity and health to life situations.
- Apply subject-based theories, concepts or principles to solve problems.

#### *D) Communication Skills*

- Access information from a variety of sources.
- Use appropriate academic terminology and notation when preparing and presenting information.
- Present ideas and arguments in a well-structured and coherent manner using appropriate communications formats.

#### *E) Awareness of Limits of Knowledge*

- Understand and appreciate the dynamic nature of information.
- Be aware of the limits in knowledge and methodologies when analyzing, evaluating, interpreting and disseminating information.

*F) Autonomy and Professional Capacity*

- Be able to evaluate new information.
- Have developed strategies to maintain or enhance knowledge in the field.
- Be able to think independently, problem solve and set tasks.
- Have developed mutually beneficial peer relationships for the purposes of mentoring and networking.

**Course Text / Readings:**

Course Notes and paper selections are available on the Moodle.

**Student responsibilities:**

1. **Attend and Participate in class** - ask questions, discuss concepts and opinions related to the course material.
2. **Take notes during lectures!** The course notes are a collection of graphs and figures, but you need to fill in the details of what is discussed during lectures.
2. **Missed Exams:** Students must have a documented urgent reason for missing a course exam, such as illness, compassionate grounds, etc., which is confirmed by appropriate supporting documentation (e.g., attending physician's statement). This documentation must be submitted to the course director within **72 hours of the missed test/exam**. Further extensions or accommodation will require students to submit a formal petition to the Faculty.

**ASSIGNMENT: Discussion of a Research Article**

Your CHOICE – Written Paper **or** Oral Presentation

***Written paper MUST be submitted at the beginning of class on Nov. 23***

Length: 6 pages double spaced (2 cm margins on all sides).

Leave no additional spaces between paragraphs

Font: Times New Roman 12 or Arial 11

No more than 3 headings to be used.

A minimum of 5 references is required; 3 of which must be original research papers – the remainder may be reviews). Only 2 references taken from the reference list of your paper.

*Penalty for late submissions as follows:*

First 1.5 hours (until 4 pm Nov. 23) -10% deduction

First 24 hours (until 2:30 pm Nov. 24) - 50% deduction

After Nov. 24, 2:30 pm -papers will not be accepted

***Oral Presentation –Scheduled in class, between Nov. 7 to Nov. 27 (depending on topic)***

*10 min. presentation, 3 min. questions*

*1 page KEY POINTS to circulate to class*

***Further details and grading scheme to be posted on Moodle.***

## **KEYS TO SUCCESS IN THIS COURSE**

1. Attend lectures!
2. Take notes from the lecture.
3. Keep up with the lecture material. Review it each week.
4. Contact me to discuss questions you have about the material.
5. Submit your paper on time/ prepare in advance for your presentation!
6. Re-read your Physiology and Exercise Physiology texts if you need to review basic concepts.

## **MORE USEFUL INFORMATION**

1. You will be examined on ALL the material presented in class.
2. The **midterm exam** will consist of short answer questions.
3. Your **final exam** will be given in a two hour block during the Fall exam period (December) and will be similar in style to the midterm.

For students who write the midterm exam, the final exam is not cumulative. If you miss the midterm exam AND provide appropriate documentation, the weighting of the midterm is added to the final.....and your final exam will be cumulative.

4. If you miss the final exam, the **makeup will be held in January**. The time will be announced later on in the term. **This is not automatic**. You must first bring the appropriate paperwork to the Course Director no later than 72 hours after the time of the final exam. **Failure to do so will result in a grade of zero on the exam.**
5. Under no circumstances will makeup exams be provided because of conflict with vacation plans or work conflicts.

***\*\*Missing an exam, assignment or presentation due to weather will be excused ONLY if the University cancels classes. Otherwise, it is YOUR responsibility to get to show up on time.\*\****

## **GENERAL COURSE POLICIES FOR STUDENTS**

All students are expected to familiarize themselves with the following information, available on the Senate Committee on Curriculum & Academic Standards webpage (see Reports, Initiatives, Documents) - [http://www.yorku.ca/secretariat/senate\\_cte\\_main\\_pages/ccas.htm](http://www.yorku.ca/secretariat/senate_cte_main_pages/ccas.htm)

- York's Academic Honesty Policy and Procedures/Academic Integrity Website
- Ethics Review Process for research involving human participants
- Course requirement accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities
- Student Conduct Standards
- Religious Observance Accommodation