

**Faculty of Health
Kinesiology and Health Science**

**HH/KINE 4453 3.0 – Vascular Function in Health and Disease
Winter 2022**

Course Instructor

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Course Description

Blood vessels are integral to the function of the cardiovascular system. The structure and function of blood vessels is dynamic, and can be modified by both positive and negative factors. This course will study the intracellular signalling pathways that regulate healthy blood vessel structure and 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 vascular diseases. We will examine current research into the mechanisms underlying these diseases, and the potential benefits of exercise as a preventative and therapeutic tool. Students will read current research papers, and discussion of these findings will be conducted in class.

(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 -

- understand details of 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.

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

Evaluation *

Test 1, 15 %	Mon. Feb. 7
Research Paper Quiz 1, 10%	Mon. Feb. 21
Test 2, 20%	Mon. March 7
Research Paper Quiz 2, 10%	Mon. March 21
Participation, 10%	<i>through-out</i>
Final Exam, 35%	TBA, during exam period

* **Grading:** Conforms to the grading system used in undergraduate programs at York. Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

DETAILS OF TOPICS TO BE COVERED

1) Vascular Structure and Function:

- Overview: Vascular network; types of blood vessels
- Biology of vascular smooth muscle and endothelium & signal pathways central in regulation of blood flow

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 and Functional Sympatholysis

b- Repeated Exercise Response

- Angiogenesis and Arteriolar Remodelling
- Large Artery remodelling and blood pressure regulation

3) Inflammation

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

4) Hypertension

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

5) Atherosclerosis

- Overview of 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

6) Restenosis

- Biological process of restenosis
- Therapeutic efforts to prevent

7) Ischemia and recovery Ie. Coronary Artery and Peripheral Artery Diseases

- Overview: link to atherosclerosis; diabetes; hypertension
- Underlying pathologies and Treatments

COURSE ADMINISTRATIVE DETAILS

Course Text: All Course Notes and relevant readings will be available on eClass course site. There is no text book.

Organization of the Course: This is an in-person course.

However, the first 3 weeks of the course (Jan 10-31) will be virtual, delivered using two 'synchronous' Zoom lectures per week, 1 -2:20 pm, Mon and Wed. Participation will be graded using attendance logs and through participation in poll questions that are asked during each lecture.

IF in-person gatherings continue to be prohibited due to public health concerns:

Course material will be delivered in 'synchronous' format, via two Zoom lectures per week, 1 -2:20 pm, Mon and Wed. Participation will be graded using attendance logs and through participation in poll questions that are asked during each lecture. Tests will occur online through eClass.

Link to the Zoom lectures will be embedded in the eClass course site. *Passport York login is required to access the Zoom lecture.*

Internet access is necessary to attend lectures and to conduct online exams. Microphone and webcam functions will be beneficial but are not required.

Zoom lectures will be recorded by the course director and the **audio-only** recordings will be posted on e-Class to enhance accessibility of the course material (ie. for students who wish to review it at a later date). Students do not have permission to make their own recordings nor to duplicate, copy and/or distribute the recordings outside of the class. These actions violate copyright, intellectual property and privacy rights. Note that recordings will be destroyed after the course ends.

When in the online Format, the following conduct is required of all students:

- Use your real name to identify yourself, otherwise you will not receive participation grades.
- Keep microphone muted except when asking questions.
- Camera/video may be on or disabled. I encourage you to participate by using keeping your camera on when possible. As a courtesy to the professor and classmates, please turn your video on when asking questions.
- Students can communicate with course director using chat. Please note that participant-participant chat is disabled.

Following Jan 31, the remainder of the course (lectures and tests) will be conducted in person. Attendance is mandatory and participation will be graded. All students are expected to adhere to current public health requirements. Lectures will be **audio-recorded** to assist any student who might need to miss a class for health/COVID-related issues - this is NOT intended to replace regular attendance and participation.

Student Responsibilities / Keys to Success

1. **Attend and Participate in class:** Attendance is required. Students are strongly encouraged to participate through asking questions during/after lectures.
2. **Take notes during lectures!** The course notes contain an important series of graphs and figures that are explained in detail during the lecture. To succeed, it is vital that you write notes that add

the details of what is discussed during lectures. This will enable you to successfully answer exam questions.

3. **Ask questions!** During, before or after lectures or contact me to arrange an alternative time.
4. Keep up with the lecture material. Review it each week.
5. Prepare for readings tests in advance so that you can ask questions if you need to clarify.
6. Re-read your Physiology and Exercise Physiology texts if you need to review basic concepts.
7. **Maintain academic integrity.** Please complete SPARK's [Academic Integrity module](#) at the beginning of the course. Breaches of academic integrity range from cheating (i.e., the improper crediting of another's work, the representation of another's ideas as your own, etc.) to aiding and abetting (helping someone else to cheat; collaborating during exams).

Breaches of academic integrity will be reported to the appropriate university authorities and can be punishable according to the [Senate Policy on Academic Honesty](#).

RESEARCH PAPER QUIZZES

These involve reading a research article that is assigned and answering a series of questions to demonstrate your understanding of the content of the paper. A sample reading paper will be provided in class and further details and grading schemes will be posted on eClass.

TESTS / EXAMS

Tests will consist of short-answer style questions and use an open-book format.

You will be examined on ALL the material presented in class (not just what is written on the slides).

Your **final exam** will be given during the Winter exam period. The final exam is cumulative but with emphasis on material from the last section of the course.

MISSED EXAMS

1. If you miss a **midterm test** (with the appropriate documentation), you will be given a 'make-up' test for that portion of the course **at the same time as the final exam**. Students must have an urgent reason, such as illness, compassionate grounds, etc., which is supported by appropriate documentation (e.g., attending physician's statement). This documentation must be submitted to the course director within **72 hours of the missed test**. Further extensions or accommodation will require students to submit a formal petition to the Faculty.
2. If you miss the **final exam**, the **makeup will be held in May. This is not automatic**. You must provide 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.**
3. If you miss **at least one of the midterm tests and the final exam**, you will need to file a petition to Faculty of Health requesting to write a deferred exam – which will be cumulative.

MISSED READING QUIZZES

If you miss a reading quiz, and you have appropriate documentation, you will write a makeup quiz at the time of the final exam.

Undergraduate Degree Level Expectations (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 internet search tools 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.
- Develop mutually beneficial peer relationships for the purposes of mentoring and networking.

GENERAL YORK U 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

- 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