Faculty of Health
Kinesiology and Health Science

HH/KINE 4453 3.0 – Vascular Function in Health and Disease
Winter 2024

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 involve an in-depth 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 tissue and the cellular level.
- gain an understanding of 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 using both oral and written formats.

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

Students need to have taken KINE 3012 or equivalent.

Evaluation *

Test 1, 20%	**Mon. Feb. 5**
Research Paper Quiz, 15%	**Mon. Mar. 4**
Test 2, 25%	**Mon. Mar. 18**
Participation, 10%	*through-out*
Final Exam, 30%	***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 grade distribution profiles.

DETAILS OF TOPICS TO BE COVERED

1) Vascular Structure and Function:

- Overview: Vascular network; types of blood vessels
- 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

4) Hypertension

- Causes of hypertension
- Smooth muscle and endothelial cell contributions to hypertension
- Impact of exercise on hypertension

5) Atherosclerosis

- Overview of the process of plaque formation/rupture
- Causes: Lipid metabolism; inflammation; role of hemodynamics
- Mechanisms: pathology of endothelium; vascular smooth muscle; infiltrating inflammatory cells

6) Restenosis

- Biological process of restenosis
- Therapeutic efforts to prevent

7) Peripheral Artery Disease

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

COURSE ADMINISTRATIVE DETAILS

Course Text: There is no textbook. Course notes will be available on eClass course site. Several review chapters are provided as supplemental information. Several readings will be required. These readings will be provided through eClass.

Organization of the Course: **This is an in-person course. Your attendance is expected. Attendance/ participation will be graded.** Lectures will be **recorded** to assist any student who might

want to miss a class for a valid reason - this is NOT intended to replace regular attendance and participation. The course director does not guarantee the quality or completeness of the lecture recordings.

TESTS / EXAMS

Tests will consist of short-answer style questions and use an open-book format. Paper (not digital) copies of slides and notes will be permitted for the test. 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 Fall exam period. The final exam is cumulative but with emphasis on material from the last section of the course.

RESEARCH PAPER QUIZ

You will read a research article that is assigned and answer 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 will be posted on eClass.

MISSED EXAMS

1. If you miss a **midterm test or the research paper quiz** (with the appropriate documentation), you will be given a 'make-up' test for that portion of the course **on the same day as the final exam**. Students must have an urgent reason (e.g. illness, compassionate grounds), 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 January 2024. 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.

PARTICIPATION

Worth a total of 10% of your grade – 5% is based on attendance (you are expected to attend 90% of classes to receive full attendance marks). 5% is based on participation in the class. This corresponds to asking questions/contributing to group discussions/completing any 'homework' assignments.

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. Your participation grade is based half on attendance and half on contributions to class discussion. Do not throw these marks away!
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. Keep up with the lecture material. Review it each week. If there are things that you didn't fully grasp, ask me questions (during, before or after lectures or contact me to arrange an alternative time).
4. Make sure you read any assigned readings. Prepare for reading test in advance so that you can ask questions if you need to clarify.
5. Re-reading your Physiology and Exercise Physiology texts can help to refresh basic concepts.
6. **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., plagiarism, copying from internet),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.

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.
- Develop 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