
1. COURSE OUTLINE FOR PHSL3211

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COURSE OUTLINE AND STRUCTURE

The cardiovascular system is vital to normal functioning of the human body. Diseases afflicting the cardiovascular system result in high rates of illness and mortality throughout the world. This course aims to educate the student in important aspects of cardiovascular physiology and pathophysiology, and to present the latest research strategies used to investigate this complex system. The course is divided into three units, over which the student will be taken from the physiology of cardiac and vascular cells, examine the function and regulation of these cells within vascular tissues and organs, and finally learn about the latest theories and techniques leading research into cardiovascular pathophysiology and disease. As the course progresses, material builds on information presented in earlier classes. Course material is delivered by staff actively engaged in cardiovascular research, able to illustrate theory with examples from their own laboratories.

Unit 1: Cellular Aspects

The aim of this unit is to become familiar with the cellular characteristics of the blood vessels wall. Further emphasis will be placed on interactions that occur between vascular cells and the extracellular environment.

Endothelial cells:

Cardiac Muscle

Smooth Muscle: Signal transduction, contractile activity, mechanics.

Electrophysiology: Ion channels relevant to the cardiovascular system.

Cellular Junctions: Gap junctions, adherens junctions, integrins

Unit 2: Integration and Control of the Cardiovascular System

This unit aims to expand the knowledge obtained in Unit 1 into circulatory systems and control situations.

Haemodynamics

Microcirculation

Lymphatics: fluid exchange, oedema, cellular basis of lymphatic function

Control of blood pressure

Control of cardiac output

Interaction with Neurohumoral Control: autonomic, hormonal, paracrine

Control of the Regional Circulations

Cardiovascular Regulation During Exercise

Unit 3: Molecular Approaches in the Study of the Cardiovascular System

Using modern state-of-the-art experimental approaches this unit aims to use pathophysiological situations to highlight function of the cardiovascular system.

Circulatory Shock

Heart Failure

Atherosclerosis – alterations in lipid handling leading to disturbed endothelial function and vasoreactivity.

Reactive Oxygen Species / Ischemia Reperfusion / Adhesion

Hypertension – use of animal models, including transgenic animals, for the study of disturbances in blood pressure control.

ASSESSMENT AND TEACHING ACTIVITIES

Final Examination	55%
Mid-session Test	20%
Practical Exam	10%
Poster Presentation	10%
PBL	5%
Total	100%

In order to achieve a satisfactory performance in this course it is anticipated that students will achieve a pass mark, or higher, in each assessment task.

- **Final Examination**

The final examination will be composed of multiple-choice and short answer questions covering the entire course. In the case of failure, a post or supplementary exam will be made available only in exceptional circumstances .

- **Mid-Session Test**

The mid-session test on April 13th will be a brief test on the material covered to that point of the course only (not including practical material), consisting of multiple-choice and short-answer questions.

- **Poster Presentation**

Work will be undertaken in groups of 3-4, to which students will be assigned. Each group will have a topic area assigned to them, and a published paper to report upon. The final product will be a Poster and should include: an Introduction; Methods; Data drawn from the article; Summary.

This poster must be completed for display in room M210 by 10AM on Wednesday 25th May 2011.

Each group is expected to provide a brief (5 mins) oral presentation of poster.

Possible Topics:

1. Endothelium-mediated vasodilatation.
2. Conducted vasomotion.
3. Ca²⁺-dependency of smooth muscle contraction.
4. Ion channels in regulation of vascular tone.
5. Ion channels in regulation of cardiac function.
6. Mechanotransduction in vascular cells.
7. Regulation of lymphatic (vaso) motion.
8. Physiology of “train high – perform low” training regimens.
9. Impact of altitude on cardiovascular physiology.
10. Transgenic models in the study of the cardiovascular system.
11. Cellular mechanisms underlying hypertension.
12. Cellular mechanisms underlying atherosclerosis.
13. Circulatory shock
14. Cellular adhesion in the cardiovascular system
15. Vascular remodelling.

Students will be assigned a topic from the above list, plus a journal article upon which to base their final presentation. Students may use the literature to find extra journal articles to complement their poster presentation. Students may consult with Dr. Murphy or other staff members regarding their assigned topic prior to completing the poster project. Assessment will be based on both the poster presentation and its oral defence.

- **Practical Classes and Exam**

There are four practical classes; Cardiac Muscle; Recording and Interpretation of the ECG; Exercise Physiology and the Autonomic Nervous System. Students will be examined on the findings of these practicals and the concepts explored in a 1-hour exam, which will consist of multiple-choice and short-answer questions.

- **Problem-Based Learning (PBL) Session**

Students will undertake self-directed learning using a case study or scenario relevant to cardiovascular physiology. In an introductory session students will be given an outline of the problem and “clues” towards what information is required. Students will then research the material and present their findings at a subsequent session. Facilitators will be available to provide direction.

- **Tutorials**

Each unit is followed by a tutorial, prior to each tutorial a work sheet will be provided. In addition, students are encouraged to collect and submit any questions relating to lecture material. Details of this process will be provided. Tutorials are expected to last between 60 and 90 minutes.

	Wk	Date	Time	Activity (Lecture, Practical, Problem Based Learning)		Teacher	
Unit One	2	Mon 7 th Mar Wed 9 th Mar Thu 10 th Mar	5-6 10-12 2-4 9-11	L - Course Introduction L- Endothelium PBL-1.1 'Joan Murray' A: Mat104, B: Mat125, C: Mat308 PBL-1.1 'Joan Murray' D: Mat104, E: Mat125, F: Mat308	MatD CLB1	TM SS TM, GF, NM TM, GF, FW	
	3	Mon 14 th Mar Wed 16 th Mar Thu 17 th Mar	5-6 10-12 2-5 9-12	L - Gap Junctions L - Cardiac Muscle P - Cardiac Muscle (A) P - Cardiac Muscle (B)	MatD MatC WW202 WW202	SS TC TM, GF TM, GF	
	4	Mon 21 st Mar Wed 23 rd Mar Thu 24 th Mar	5-6 10-12 9-11	L - Vascular Smooth Muscle: Electrophysiology L - Vascular Smooth Muscle: Mechanics and Signal Transduction PBL-1.2 'Joan Murray' A: Mat104, B: Mat125, C: Mat308 PBL-1.2 'Joan Murray' D: Mat104, E: Mat125, F: Mat308	MatD CLB1	TM TM TM, GF, NM TM, GF, FW	
	5	Mon 28 th Mar Wed 30 th Mar	5-6 10-12	Tutorial - Unit One L - Haemodynamics	MatD CLB1	TM / on-line MP	
Unit Two	6	Mon 4 th Apr Wed 6 th Apr Thu 7 th Apr	5-6 10-11 11-12 2-5 9-12	L- Microcirculation L- Lymphatics L- Introduction to the ECG P- Recording and Interpretation of the ECG (A) P- Recording and Interpretation of the ECG (B)	MatD CLB1 CLB1 Bio329 Bio329	TM TM KG KG, TM KG, TM	
	7	Mon 11 th Apr Wed 13 th Apr Thu 14 th Apr	5-6 10-11 2-5 9-12	L- Cardiovascular Regulation During Exercise Mid-Session Test P- Exercise Physiology (A) P- Exercise Physiology (B)	MatD CLB1 WW202 WW202	SB TM SB SB	
	8	Wed 20 th Apr Thu 21 st Apr	10-12 2-5 9-12	L- Control of Cardiac Output P - Computer Lab - Isolated Heart Muscle and Cardiovascular Exercises (A) P - Computer Lab - Isolated Heart Muscle and Cardiovascular Exercises (B)	CLB1 WW202 WW202	TM TM, MRB TM, MRB	
	22 nd - 29 th April – MID-SESSION RECESS – MID-SESSION RECESS – MID-SESSION RECESS						
	9	Mon 2 nd May Wed 4 th May Thu 5 th May	5-6 10-12 2-5 9-12	L- Autonomic Control of the Cardiovascular System L - Control of Blood Pressure P - Autonomic Nervous System (A) P - Autonomic Nervous System (B)	MatD CLB1 WW202 WW202	TM TM TM, MRB TM, MRB	
	10	Mon 9 th May Wed 11 th May	5-6 10-12	Practical Exam L- Control of the Regional Circulations	MatD CLB1	NM/GF MP	
Unit Three	11	Mon 16 th May Wed 18 th May Thu 19 th May	5-6 10-12 2-3 9-10	L- Gene Expression and Cardiovascular Disease L - Hypertension Tutorial Unit Two (A) Tutorial Unit Two (B)	MatD CLB1 Bio329 Bio329	LK MM TM / on-line TM / on-line	
	12	Mon 23 rd May Wed 25 th May	5-6 10-12 2-5	L - Circulatory Shock L- Atherosclerosis Poster Presentations (A & B)	MatD CLB1 WW202/ 4	TM MK Staff	
	13	Wed 1 st June	10-11 11-12 2-3	L- Heart Failure L- Oxygen Radicals and Reperfusion Injury Tutorial Unit Three	CLB1 CLB1 MatD	TC NJ TM	

Lecturers and Teaching Staff

GF	Mr. George Fatseas	MRB	Mr. Matthew Rikard-Bell
KG	A/Prof. Karen Gibson	NJ	Dr. Nicole Jones
LK	Prof. Levon Khachigian	NM	Dr. Nicole Marden
MM	Prof. Margaret Morris	SB	A/Prof. Steve Boutcher
MK	Dr. Maaike Kockx	SS	Dr. Shaun Sandow
MP	A/Prof. Michael Perry	TC	Prof. Terry Campbell
		TM	Dr. Tim Murphy
