



UNSW
AUSTRALIA

Medical Sciences
Medicine

Department of Physiology

PHSL3211

**Cardiovascular Physiology
and
Pathophysiology**

Semester 1, 2016
Course Outline

Please read this outline in conjunction with the following pages on the [School of Medical Sciences website](#):

- [Advice for Students](#)
- [Learning Resources](#)

(or see "STUDENTS" tab at medicallsciences.med.unsw.edu.au)

COURSE COORDINATORS

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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
- Cardiac Arrhythmia and 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	50%	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.
Mid-session Test	20%	
Practical Exam	10%	
Poster Presentation	10%	
PBLs	10%	
Total	100%	

Final Examination

The final examination will be composed of multiple-choice and short answer questions covering the entire course. Post or supplementary exams will be made available only in exceptional circumstances .

Mid-Session Test

The mid-session test on April 15th 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 WW116 by 2PM on Wednesday 1st June 2016.

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 'wet' 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 on Friday May 6th, which will consist of multiple-choice and short-answer questions.

Problem-Based Learning (PBL) Session

Students will undertake self-directed learning using case studies or scenarios 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, with practice multi-choice and short-answer questions on-line. These questions do not constitute a 'bank' of questions and will not appear on any exam. In addition, students are encouraged to collect and submit any questions relating to lecture material, either directly via e-mail or through the discussion boards on Moodle.

TIMETABLE 2016

	Wk	Date	Time	Activity (Lecture, Practical, Problem Based Learning)	Teacher		
Unit One	2	Wed 9 th Mar	11-1	L - Course Introduction / Cardiac Muscle	LG03	TM / MaP	
		Thurs 10 th Mar	10-1	P - Cardiac Muscle (A)	WW116	TM, SW, TBC	
			2-5	P - Cardiac Muscle (B)	WW116	TM, SW, TBC	
		Fri 11 th Mar	12-1	L - Vascular Smooth Muscle: Electrophysiology	Clmbo B	TM	
3	Weds 16 th Mar	Thurs 17 th Mar	11-1	L - Endothelium	LG03	SS	
			10-12	PBL-1.1 'Joan Murray' A: LG03, B: G08, C: Mat102 PBL-1.1 'Joan Murray' D: Mat230, E: Mat231, F: Mat232		TM, FB, WH	
		Fri 18 th Mar	12-1	L - Gap Junctions	Clmbo B	SS	
4	Weds 23 rd Mar	Thurs 24 th Mar	11-1	L - Vascular Smooth Muscle: Mechanics	LG03	TM	
			10-11	Tutorial Unit One	WW116	TM / on-line	
25th Mar - 3rd April – MID-SESSION RECESS							
Unit Two	5	Weds 6 th Apr	Thu 7 th Apr	11-1	L - Control of Cardiac Output	LG03	FB
				10-12	PBL-1.2 'Joan Murray' A: LG03, B: G08, C: Mat102 PBL-1.2 'Joan Murray' D: Mat230, E: Mat231, F: Mat232		TBC, FB, WH
			Fri 8 th Apr	12-1	L - Introduction to the ECG	Clmbo B	KG
	6	Weds 13 th Apr	Thurs 14 th Apr	11-1	L - Haemodynamics	LG03	MiP
				10-1	P - Recording and Interpretation of the ECG (A)	WW116	KG, TM, JP
			Fri 15 th Apr	12-1	P - Recording and Interpretation of the ECG (B) Mid-Session Exam	Clmbo B	KG, TM, JP TM, SW
	7	Weds 20 th Apr	Thurs 21 st Apr	11-1	L - Control of Blood Pressure	LG03	TM
				10-1	P - Computer Lab: Isolated Heart Muscle and Cardiovascular Exercises	WW116	TM, SW
			Fri 22 nd Apr	12-1	P - Computer Lab: Isolated Heart Muscle and Cardiovascular Exercises L - Cardiovascular Regulation During Exercise	Clmbo B	TM, SW SB
	8	Weds 27 th Apr	Thurs 28 th Apr	11-1	L - Microcirculation and Lymphatics	LG03	TM
				10-1	P - Exercise Physiology (A)	WW116	SB, staff
			Fri 29 th Apr	12-1	P - Exercise Physiology (B) L - Autonomic Control of the Cardiovascular System	Clmbo B	SB, staff LL
9	Weds 4 th May	Thurs 5 th May	11-1	L - Control of the Regional Circulations	LG03	TM	
			10-1	P - Autonomic Control of the CVS	WW116	TM, JP, HN	
	Fri 6 th May	5-6	P - Autonomic Control of the CVS Practical Exam	Clmbo B	TM, JP, HN TM, SW		
Unit Three	10	Wed 11 th May	Thur 12 th May	11-1	L - Hypertension	LG03	MM
				10-12	PBL-2.1 'Michael Koval' A: LG03, B: G08, C: Mat102 PBL-2.1 'Michael Koval' D: Mat230, E: Mat231, F: Mat232		TM, FB, WH
			Fri 13 th May	12-1	Tutorial Unit 2	Clmbo B	TM, FB, WH TM
	11	Wed 18 th May	Fri 20 th May	11-1	L - Atherosclerosis	LG03	FT
				12-1	L - Cardiac Arrhythmia	Clmbo B	JV
	12	Wed 25 th May	Thur 26 th May	11-12	L - Heart Failure	LG03	TC
12-1				L - Oxygen Radicals and Reperfusion Injury	LG03	NJ	
			10-12	PBL-2.2 'Michael Koval' A: LG03, B: G08, C: Mat102 PBL-2.2 'Michael Koval' D: Mat230, E: Mat231, F: Mat232		TM, FB, WH TM, FB, WH	
	Fri 27 th May	12-1	L - Circulatory Shock	Clmbo B	TM		
13	Weds 1 st Jun	Fri 3 rd Jun	11-1	Poster Presentations	WW120	Staff	
			12-1	Tutorial Unit 3	Clmbo B	TM	

LECTURERS AND TEACHING STAFF

FB	Dr Fiona Britton	MM	Prof. Margaret Morris	TC	Prof. Terry Campbell
FT	Dr Fatiha Tabet	MaP	Dr Matt Perry	TM	Dr. Tim Murphy
HN	Mr Hong Nguyen	MiP	A/Prof Michael Perry	WH	Dr. Will Hatton
JP	Ms Jasneet Parmar	NJ	Dr. Nicole Jones		
JV	Prof Jamie Vandenberg	SB	A/Prof. Steve Boutcher		
KG	Dr. Karen Gibson	SS	Dr. Shaun Sandow		
LL	Dr Lu Liu	SW	Dr. Sarah Wright		