



# BIOL247

## Systems Physiology

S2 Day 2016

*Dept of Biological Sciences*

### Contents

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<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	2
<a href="#"><u>General Assessment Information</u></a>	3
<a href="#"><u>Assessment Tasks</u></a>	3
<a href="#"><u>Delivery and Resources</u></a>	6
<a href="#"><u>Unit Schedule</u></a>	6
<a href="#"><u>Policies and Procedures</u></a>	9
<a href="#"><u>Graduate Capabilities</u></a>	11
<a href="#"><u>Changes from Previous Offering</u></a>	15
<a href="#"><u>Changes since First Published</u></a>	15

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## General Information

### Unit convenor and teaching staff

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### Credit points

3

### Prerequisites

6cp(P) from BBE100 or BIOL108 or BIOL114 or BIOL115 or BIOL116 or BIOL122 or HLTH108 or HLTH109 or PSY104 or PSY105 or PSYC104 or PSYC105

### Corequisites

### Co-badged status

### Unit description

This unit considers the maintenance of body homeostasis. We investigate the cardiovascular system including an examination of the electrical and mechanical functions of the heart, its interaction with the blood vessels, and the hormones and the autonomic nervous system that control heart function. Next we study the role of the renal system in the control of the chemical composition of the body, water balance and body fluid volume. An overview of the respiratory and gastrointestinal systems will follow. Practical classes involve measuring physiological parameters such as blood pressure and electrical conduction through the heart (the ECG) in humans.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
2. Identify specific structural features of organ systems and explain how they underlie essential functions
3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response
6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics Committee
7. Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## General Assessment Information

Students are expected to attend all the practical classes and there will be questions on the material covered in the practical classes in the two quizzes, the mid-semester test and the final examination.

A hurdle requirement is an activity for which a minimum level of performance or participation is a condition of passing a unit.

In BIOL247 the final exam is the hurdle assessment and the university has stipulated that if you have made a serious attempt but failed to pass a hurdle requirement you will be given a second chance to attain a passing grade. The pass mark for the final exam is 45%. Students who have a mark of 35 to 44% in the final exam will be able to sit the exam again. The exam papers for the first and second attempts will be the same in style (i.e. multiple choice and short answer questions) but the actual questions will be different.

## Assessment Tasks

Name	Weighting	Due
<u>Mini-test Quiz</u>	5%	Int W4; Ext 19/9/16
<u>Mid-semester test</u>	15%	int W 7;ext 19/9/16
<u>Practical assessment</u>	10%	Week 6 and Week 11
<u>Tutorial Questions</u>	10%	04/10/2016
<u>Final exam</u>	60%	Examination Period

## Mini-test Quiz

Due: **Int W4; Ext 19/9/16**

Weighting: **5%**

This Mini-test Quiz is on the first 4 lectures, the Langendorff perfused heart video and the ECG practical . For this test there will be 15 multiple choice questions and the test will be held at home in open book format. This test is designed for you to see how you are going in BIOL247 and you will receive your marks before the census date.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response

## Mid-semester test

Due: **int W 7;ext 19/9/16**

Weighting: **15%**

The mid-semester test will be held in your normal practical sessions during week 7. This test will include 35 multiple choice questions to be completed in 40 minutes. All the cardiovascular section, the first three renal lectures (lectures 1-12) and the material presented in the practical classes will be included in the test. You will find practice cardiovascular and renal multiple choice questions on the iLean site.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response

## Practical assessment

Due: **Week 6 and Week 11**

Weighting: **10%**

There are **two** online quizzes that are linked to practical classes. The quiz on the "Effect of Posture on BP and Heart Rate" will be held in week 6 and the Digestion practical quiz will be in week 11.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics Committee
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## Tutorial Questions

Due: **04/10/2016**

Weighting: **10%**

You will be asked to answer five tutorial questions on the cardiovascular and renal systems. The aim of these questions is to familiarise you with the types of short answer questions you might encounter in the final exam. The answers are to be submitted to Turnitin via the iLearn site on the 4<sup>th</sup> of October.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response

## Final exam

Due: **Examination Period**

Weighting: **60%**

The exam is a three hour paper with 33% of the marks as multiple choice questions, and the rest from short answer questions (a paragraph or dot points or a diagram). The short answer questions will be in two parts and in each part you will answer 6 out of 8 questions.

All the lecture and practical material is examinable. A non-programmable calculator will be required in the exam but dictionaries are not allowed.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response

## Delivery and Resources

### Unit material and Textbooks

The textbook for this unit is “Principals of Human Physiology” 4th or 5th edition by Cindy L Stanfield, published by Pearson.

An alternative is “Physiology” by Jake Mann and David Marples published by JP medical publishers. This book is one of the eureka series and it is cheaper and more concise than Stanfield but still covers the content of BIOL247.

Other physiological texts of a similar standard may also be suitable.

### iLearn

Your iLearn site will contain the unit outline, lecture graphics, the text of the lectures, a link to ECHO 360 practical notes, announcements and discussion areas, and other information to help you complete the unit. Later, practice tests, quizzes and assignment marks will be added. **Please check this site regularly. You should also check your university email regularly for important announcements.**

## Unit Schedule

### Lecture Timetable 2016

Week	Beginning on	Lecture
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1	1/8	1. Overview of the cardiovascular system
		2. Electrical activity of the heart
2	8/8	3. Generation of the heartbeat
		4. Regulation of contraction of cardiac muscle
3	15/8	5. Physics of the circulation
		6. Components of the circulation and their specific functions
4	22/8	7. Function of the microcirculation/Control of blood flow
		8. Regulation of cardiac output
5	29/8	9. Short term regulation of the arterial blood pressure
		L10. Structure and function of the renal system
6	5/9	11. Production of urine by the nephron
		12. Excretion as the outcome of filtration, reabsorption and secretion
7	12/9	13. Water balance: The control of ECF osmolarity
		14. Sodium balance : The control of the ECF volume and blood pressure

**Study break: 19/9/16 – 3/10/16**

8	3/10	15. Structure and function of the respiratory system
		16. The process of breathing
9	10/10	17. Alveolar ventilation and perfusion
		18. Gas exchange and the carriage of O <sub>2</sub> and CO <sub>2</sub> in the blood
10	17/10	19. Control of respiration
		20. Nutrition
11	24/10	21. Function and organisation of the gastrointestinal system
		22. Motility of the gastrointestinal system

12	31/10	23. Secretion in the gastrointestinal system
		24. Digestion and absorption of food
13	7/11	25. Catch up lecture and description of the final exam
		no lecture

### Internal Practical Timetable 2016

W	Practical Group A	Practical Group B & C
1	<b>For students who have not completed BIOL257 only;</b> Tutorial on resting and acting potentials, nerves, muscles and the autonomic nervous system	
2	The electrocardiogram (ECG) and human cardiovascular function	Introductory tutorial and the Langendorff perfused heart video and questions
3	Introductory tutorial and the Langendorff perfused heart video and questions	The electrocardiogram (ECG) and human cardiovascular function
4	Cardiovascular system and the effect of posture on heart rate and blood pressure	
5	Analysis of blood pressure control during postural changes	
6	Permeability, osmolarity and tonicity ( <b>lab coats</b> ) ( <b>online quiz on BP and posture</b> )	
7	<b>Mid-semester test; MCQ test on cardiovascular and renal systems (L1-12)</b>	

### Study break: 19/9/16– 3/10/16

8	No practical on Monday (Public Holiday) <b>(Tutorial questions due 4/10)</b>	Review of test and body compartments tutorial questions <b>(Tutorial questions due 4/10)</b>
9	Review of test and Nutrition practical	Digestion prac ( <b>lab coats</b> )
10	Digestion prac ( <b>lab coats</b> )	Nutrition Practical



11	<u>Discussion of the results of the digestion practical and tutorial questions on renal function</u> (plus body compartment tutorial questions for Monday group)  (online quiz on Digestion prac)
12	Revision tutorial based on 2013 exam paper (Externals welcome)
13	No Prac

### External Students Practical Timetable 2016

External students will attend practical classes on 27<sup>th</sup> & 28<sup>th</sup> of August and the 19<sup>th</sup> & 20<sup>th</sup> of September. The classes start promptly at 9.00 am and will be held in F7B 102, 105 and 110.

External students are invited to any of the internal revision sessions in week 12.

Saturday 27/8	Monday 19/9
Introduction	<b>Mid-semester test</b>
Langendorff heart DVD	Body compartments tutorial questions
Cardiovascular system and the effect of posture on heart rate and blood pressure	Renal function tutorial questions
Tutorial on the effect of posture on the cardiovascular system	Nutrition practical
Sunday 28/8	Tuesday 20/9
The electrocardiogram (ECG)	Digestion practical
	Review of mid-semester test

For external students, the mid-semester test on the cardiovascular and renal systems is on Monday, 19<sup>th</sup> September. It will cover Lectures 1-12 and the practical classes completed in the first on campus session.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcome

- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes

#### Assessment tasks

- Mid-semester test
- Final exam

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

#### Learning outcome

- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics Committee

#### Assessment tasks

- Practical assessment
- Tutorial Questions

## Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

### Learning outcomes

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response
- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics Committee
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

### Assessment tasks

- Mini-test Quiz
- Mid-semester test
- Practical assessment
- Tutorial Questions
- Final exam

## Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## Learning outcomes

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of homeostasis
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## Assessment tasks

- Mini-test Quiz
- Mid-semester test
- Practical assessment
- Tutorial Questions
- Final exam

## Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## Learning outcomes

- 2. Identify specific structural features of organ systems and explain how they underlie essential functions
- 3. Use equations describing physical, chemical and electrical principles to predict and interpret important physiological processes
- 4. Identify situations in which the integrated function of several organ systems interact to produce a coordinated response
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## Assessment tasks

- Mid-semester test
- Practical assessment

- Tutorial Questions
- Final exam

## Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

### Learning outcome

- 7. Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

### Assessment tasks

- Practical assessment
- Tutorial Questions

## Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

### Learning outcome

- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics Committee

### Assessment task

- Practical assessment

## Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

## Learning outcome

- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics Committee

## Assessment task

- Practical assessment

## Changes from Previous Offering

Tutorial questions have replaced the Essay as an assessment task.

"Hurdle requirements have been introduced in S2 2016. A hurdle requirement is an activity for which a minimum level of performance or participation is a condition of passing a unit. In BIOL247 the final exam is the hurdle assessment and the university has stipulated that if you have made a serious attempt but failed to pass a hurdle requirement you will be given a second chance to attain a passing grade. The pass mark for the final exam is 45%. Students who have a mark of 35 to 44% in the final exam will be able to sit the exam again. The exam papers for the first and second attempts will be the same in style (i.e. multiple choice and short answer questions) but the actual questions will be different.

## Changes since First Published

Date	Description
29/07/2016	Mini-test Quiz is now at home Added technical staff