



BIOL376

Advanced Human Physiology

S1 External 2019

Dept of Biological Sciences

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General Information

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Credit points

3

Prerequisites

(BIOL247 and BIOL257) or (admission to BHumanSc or BA-PsychBHumanSc or BPsych(Hons)BHumanSc or BSpHLScBHumanSc and 6cp at 200 level including BIOL247)

Corequisites

HLTH306 or HLTH309 or HLTH310 or HLTH316 or HLTH317 or BIOL345 or BIOL367 or CBMS306 or CBMS335 or CBMS337 or PSY354 or STAT395

Co-badged status

Unit description

This unit follows on from BIO257 and BIOL247. We will investigate the interaction of the renal and respiratory systems in the control of body pH. The next topic is the control of blood pressure leading to a discussion of hypertension and exercise. We continue with endocrinology discussing signal transduction and messenger pathways, and the role of hormones in the regulation of plasma potassium, calcium and glucose concentrations. A discussion of neuroendocrine systems and function of thyroid, sex, growth, mineralocorticoid and glucocorticoid hormones leads into a discussion of stress and the stress hormones. As obesity is currently a major threat to human health we will consider energy balance and the neurological basis for homeostatic and hedonic control of appetite before investigating other factors involved in weight control including genetics, foetal programming, protein leverage and the gut microbiota. The final two lectures will be on the neurobiology of the reward systems involved in hedonic eating and drug addiction. Practical classes make use of computer-assisted learning, as well as laboratory experiments. We will measure physiological parameters such as blood pressure during exercise, acid and base in the urine and stress hormones in the saliva. In these classes students will act both as investigators and experimental subjects.

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:

- Explain how the cardiovascular, renal, and respiratory systems contribute to homeostasis
- Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects
- Analyze experimental data and interpret physiological significance
- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

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 mid-semester test and the final examination. The

pass mark for the final exam is 45% and to achieve a pass in BIOL376 the total of your exam marks and in semester assignments must equal 50% or above.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESup) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

A **hurdle requirement** is an activity for which a minimum level of performance or participation is a condition of passing a unit. In BIOL376 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% 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.

If you are given a second opportunity to sit the final examination as a result of failing to meet the minimum mark required, you will be offered that chance during the supplementary examination period and will be notified of the exact day and time after the publication of final results for the unit .

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|--|-----------|--------|-----------------------------|
| <u>Acid /base balance assignment</u> | 10% | No | 30/04/2019 |
| <u>Mid semester test</u> | 10% | No | Internals week 7 |
| <u>Essay</u> | 10% | No | 30/04/2019 |
| <u>Seminar</u> | 10% | No | Internals weeks 9 and 10 |
| <u>Formal exam</u> | 60% | Yes | End of semester exam period |

Acid /base balance assignment

Due: **30/04/2019**

Weighting: **10%**

In this assignment, excretion rates of the control and treatment groups will be compared. To do this the time courses of the urine excretion rates, total acid excretion rates, urine pH, and the rates of bicarbonate excretion will be plotted. Students will answer a series of questions that are

designed to probe the physiological mechanisms that produce the experimental results. The details of this assignment are in the practical manual

The assignment must be written in your own words and submitted through Turnitin.

The due date for both internal and external students is 30/4/2019.

On successful completion you will be able to:

- Explain how the cardiovascular, renal, and respiratory systems contribute to homeostasis
- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects
- Analyze experimental data and interpret physiological significance
- Critically evaluate information and form logical arguments supported by experimental evidence

Mid semester test

Due: **Internals week 7**

Weighting: **10%**

This test will include 35 multiple choice questions to be completed in 60 minutes. All the material in lectures 1-10 and the material presented in the practical classes will be included in the test.

For internal students the test will be held in the normal practical class in week 7. External students will do their test during the second on-campus session on 23/4/2019 at 9 am.

On successful completion you will be able to:

- Explain how the cardiovascular, renal, and respiratory systems contribute to homeostasis
- Synthesize information from the scientific literature for presentation in written and oral formats

Essay

Due: **30/04/2019**

Weighting: **10%**

The essay will be of 1,000 words and the topic will be chosen from the list on the iLearn site. The essay must be written in your own words. The main criterion for marking will be the physiological content but writing style will also be considered. The rubric used to mark the essay is on the iLearn site.

The source of all statements and diagrams obtained from the literature must be cited. The

reference list only contains the articles that you have actually cited in the essay. Citations and the reference list should be in Harvard Style. For more information go to

[www.bio.mq.edu.au/files/Harvard%20Referencing%20System%202012\(5\).pdf](http://www.bio.mq.edu.au/files/Harvard%20Referencing%20System%202012(5).pdf)

The essay must be written in your own words and submitted through Turnitin. **The due date for both internal and external students is 30/4/2019.** As the due date for the essay and the Acid/Base Balance assignment is the same it is best to start on the essay early in the semester.

On successful completion you will be able to:

- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Seminar

Due: **Internals weeks 9 and 10**

Weighting: **10%**

The seminar topics will be the same as your essay topic. You will present your seminar as part of a team of three students. Each seminar is of 15 minutes duration with an extra 5 minutes of question time. There will be time during the practical sessions for you to decide on the distribution of tasks between team members. All three students must present part of the seminar and answer questions from the audience.

The main criterion for marking will be the quality of presentation although the physiological content will also be considered and the rubric used to mark the seminar is included on the ilearn site

External students will present their seminars during the second on-campus session on 24/4/2019 starting at 9 am.

On successful completion you will be able to:

- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Formal exam

Due: **End of semester exam period**

Weighting: **60%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle

assessment tasks)

The exam is a three hour paper. One third of the marks will be for multiple choice questions, and the rest from short answer questions (a paragraph or dot points or a diagram). There will be some choice for the short answer questions.

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

On successful completion you will be able to:

- Explain how the cardiovascular, renal, and respiratory systems contribute to homeostasis
- Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Delivery and Resources

Timetable

There will be two lectures each week and these will be on Monday at 2 pm in 23 Wallys Wlk T1 Theatre and Wednesday 2 pm in 23 Wallys Wlk T2. All lectures will be recorded and available on iLearn.

Each week internal students are expected attend one practical class on either Tuesday from 2 pm to 5 pm or Wednesday from 10 am until 1 pm. All practical classes will be in 4 Wallys WLK Science labs (F7B 102, 105 and 110).

Practical sessions for external students will be held on Saturday 23th and Sunday 24th March and on Tuesday 23th and Wednesday 24th of April in the 4 Wallys WLK Science labs (F7B 102, 105 and 110). External students need to attend all four days of the on-campus sessions.

Unit material and Textbooks

The textbook for this unit is “Principals of Human Physiology” 6th edition by Cindy L Stanfield, published by Pearson. You can subscribe to the new digital version (6th addition) at

<http://www.pearson.com.au/9781292156491> and you do not need MasteringA&P.

However, much of the material covered in BIOL376 is not available in text books. When this is the case, I have included relevant references in the lecture graphics.

iLearn

Your iLearn site will contain the unit outline, lecture graphics, lecture notes, practical manual, a link to the Active Learning Platform for audio visual recordings of lectures, announcements and

discussion areas. Later, marks for in semester assessments tasks will be available in Grade Book. **Please check this site and your student email regularly.**

Unit Schedule

Lecture Timetable 2019

| Week | Beginning on | Lecture |
|------|--------------|---|
| 1 | 25/2 | 1. Short term control of BP |
| | | 2. Long term control of BP |
| 2 | 4/3 | 3. Hypertension |
| | | 4. Exercise I |
| 3 | 11/3 | 5. Exercise II |
| | | 6. Acid base regulation in the body |
| 4 | 18/3 | 7. Disturbances acid/base balance |
| | | 8. Hormones, signal transduction and cell messengers |
| 5 | 25/3 | 9. Regulation of plasma K ⁺ concentration |
| | | 10. Regulation of plasma Ca ²⁺ concentration |
| 6 | 1/4 | 11. Neuroendocrinology |
| | | 12. Regulation of plasma glucose concentration |
| 7 | 8/4 | Catch up lecture |
| | | Mid-semester test in practical session |

Study break: 13/4-28/4

| | | |
|---|------|---|
| 8 | 29/4 | 13. Stress hormones |
| | | 14. The obesity epidemic and energy balance |
| 9 | 6/5 | 15. Homeostatic control of appetite |

| | | |
|----|------|--|
| | | 16. Reward systems and hedonic eating |
| 10 | 13/5 | 17. Genetics of obesity |
| | | 18. Foetal effects and epigenetics(Dr Jess Buxton; NS talks) |
| 11 | 20/5 | 19. Protein and energy balance |
| | | 20. The microbiota |
| 12 | 27/5 | 21. TBA |
| | | 22. TBA |
| 13 | 3/6 | no lecture |
| | | no lecture |

Internal Practical Timetable 2019

| Wk | Practical |
|----|---|
| 1 | no practical |
| 2 | Introduction to BIOL76 and organize seminar groups Discuss safety and protocol for the exercise prac, organize subjects and sign consent forms, practice blood pressure measurement, begin experiments |
| 3 | The effect of exercise on the cardiovascular system- complete experiments and analyze results |
| 4 | Acid-base balance tutorial (calculator with logs needed for this prac) Discuss ethics and protocol for the acid base prac, organize subjects and sign consent forms |
| 5 | The effect of net acid or base ingestion on the pH and the hydrogen ion and bicarbonate excretion in the urine (lab coats) |
| 6 | Analysis of acid base practical results |
| 7 | Mid-semester test |

Study break: 13/4-28/4

| | |
|---|---|
| 8 | Revision of the mid-semester test and case studies; collection of tubes for saliva (essay submission 30/4 internal and external students) |
| 9 | Student Seminars |

| | |
|----|--|
| 10 | Student seminars |
| 11 | Salivary cortisol (lab coats), lactose/fructose intolerance and case studies plus tutorial on plasma glucose immediately after a meal and during a fast |
| 12 | Salivary cortisol results and revision session based on the 2017 exam paper |
| 13 | No practical |

External Practical Timetable 2019

Practical sessions for external students will be held on Saturday 23rd and Sunday 24th March and on Tuesday and Wednesday the 23rd and 24th April. The classes start promptly at 9.00 am and will be held in 4 WW-110 Science lab (F7B 110).

| Saturday 23/03/2019 | Tuesday 23/04/2019 |
|--|----------------------------------|
| Introduction | Mid-semester test |
| Acid-base balance tutorial and discuss ethics and protocol for the acid base pracs, organise subjects and sign consent forms | Cortisol in the saliva |
| The effect of net acid or base ingestion on the pH, hydrogen ion and bicarbonate excretion in the urine (lab coats) | Case studies |
| Sunday 24/03/2019 | Wednesday 24/04/2019 |
| Analysis of the acid base prac results | Student Seminars |
| Exercise and the cardiovascular system | Analysis of cortisol results |
| | Lactose and fructose intolerance |

Please note that for external students, the mid-semester test on the cardiovascular and renal systems, which is worth 10% of the marks, is on Tuesday 23/04/2019.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@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) 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

If you are a Global MBA student contact globalmba.support@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/.

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 outcomes

- Analyze experimental data and interpret physiological significance
- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Assessment tasks

- Essay
- Seminar

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 outcomes

- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects
- Analyze experimental data and interpret physiological significance
- Synthesize information from the scientific literature for presentation in written and oral formats

Assessment tasks

- Acid /base balance assignment
- Formal exam

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- Synthesize information from the scientific literature for presentation in written and oral formats

Assessment tasks

- Essay
- Seminar

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

- Explain how the cardiovascular, renal, and respiratory systems contribute to

homeostasis

- Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects
- Analyze experimental data and interpret physiological significance
- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Assessment tasks

- Acid /base balance assignment
- Mid semester test
- Essay
- Seminar
- Formal 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

- Explain how the cardiovascular, renal, and respiratory systems contribute to homeostasis
- Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- Analyze experimental data and interpret physiological significance
- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Assessment tasks

- Acid /base balance assignment
- Mid semester test
- Essay
- Seminar
- Formal 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

- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects
- Analyze experimental data and interpret physiological significance
- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Assessment task

- Acid /base balance assignment

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 outcomes

- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects
- Analyze experimental data and interpret physiological significance

- Synthesize information from the scientific literature for presentation in written and oral formats
- Critically evaluate information and form logical arguments supported by experimental evidence

Assessment tasks

- Acid /base balance assignment
- Essay
- Seminar
- Formal exam

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 outcomes

- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects

Assessment task

- Acid /base balance assignment

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 outcomes

- Perform experiments safely with human subjects
- Practice measurements of physiological responses in human subjects

Assessment task

- Acid /base balance assignment

Changes from Previous Offering

In 2019 the Exercise Questions are no longer an assignment but will be discussed in class as tutorial question. The Acid/ Balance Assignment is now worth 10% of the total marks.