



BIOL376

Advanced Human Physiology

S2 Day 2016

Dept of Biological Sciences

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Disclaimer

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General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

(BIOL247 and BIOL257) or (admission to BHumanSc and 6cp at 200 level including BIOL247)

Corequisites

HLTH306 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:

1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of blood pressure and acid base balance in the body
2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs
6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics and Biohazard Committees
7. Collect experimental data accurately and analyse, graph and apply statistical methods

and then to interpret the physiological significance of the results

8. Measure blood pressure in control and stressed subjects, the change in the chemical composition of urine from subjects ingesting acid or base, the diurnal rhythm of cortisol concentration in saliva, and the hydrogen produced by gut bacteria in exhaled breath

Assessment Tasks

Name	Weighting	Due
<u>Practical Assignment</u>	10%	Int 5/9/16; Ext 12/9/16
<u>Mid-semester test</u>	10%	Int W7; Ext 22/9/16
<u>Essay</u>	10%	4/10/16
<u>Seminar</u>	10%	Int w 9&10;Ext 22/9/16
<u>Final exam</u>	60%	In formal examination period

Practical Assignment

Due: **Int 5/9/16; Ext 12/9/16**

Weighting: **10%**

Assignment on the acid base balance experiment

In this assignment results of the experiment will be plotted to compare the excretion rates and the urine pH of the three treatment groups and the control over the time course of the experiment. To complete the assignment students will answer a series of questions that are designed to probe the physiological mechanisms that produce the experimental results.

The assignment must be converted to PDF files and submitted through Turnitin.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs
- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics and Biohazard Committees

- 7. Collect experimental data accurately and analyse, graph and apply statistical methods and then to interpret the physiological significance of the results
- 8. Measure blood pressure in control and stressed subjects, the change in the chemical composition of urine from subjects ingesting acid or base, the diurnal rhythm of cortisol concentration in saliva, and the hydrogen produced by gut bacteria in exhaled breath

Mid-semester test

Due: **Int W7; Ext 22/9/16**

Weighting: **10%**

This test will include 30 multiple choice questions to be completed in 40 minutes. All the material in lectures 1-12 and the material presented in the practical classes will be included in the test.

On successful completion you will be able to:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body

Essay

Due: **4/10/16**

Weighting: **10%**

The essay will be of 1,500 words and the topic will be chosen from the list in your unit guide. The essay must be written in your own words.

On successful completion you will be able to:

- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs

Seminar

Due: **Int w 9&10; Ext 22/9/16**

Weighting: **10%**

Your seminar topics will be the same as your essay topic. You will present your seminar as part of a team of three students. There will be time during the practical sessions for you to decide on the distribution of tasks between team members. All three must present part of the seminar and answer questions at the end of the seminar.

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 below.

On successful completion you will be able to:

- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs

Final exam

Due: **In formal examination period**

Weighting: **60%**

The exam is a three hour, closed-book 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:

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs

Delivery and Resources

Unit material and Textbooks

The textbook for this unit is “Principals of Human Physiology” 4th edition by Cindy L Stanfield, published in 2011 by Pearson. 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 Echo 360, announcements and discussion areas. Later, marks for in semester assessments tasks will be added. Please check this site and your student email regularly.

Unit Schedule

Timetable

There will be two lectures each week and these will be on Tuesdays at 9 am in E7B T5 and on Friday at 9 am in the C5C Collaborative forum. All lectures will be recorded and available on iLearn.

Each week students are expected attend one practical class at either Thursday from 1 pm to 4 pm or Friday from 10 am until 1 pm. All practical classes will be in F7B 102, 105 or 110.

Practical sessions for external students will be held on Saturday 3rd and Sunday 4th September and on Thursday and Friday the 22nd & 23rd September.

Lecture Timetable 2016

Week	Beginning on	Lecture
1	1/8	1. Acid base regulation in the body
		2. Disturbances acid/base balance
2	8/8	3. Short term control of BP
		4. Long term control of BP
3	15/8	5. Hypertension
		6. Exercise I
4	22/8	7. Exercise II
		8. Hormones, signal transduction and cell messengers
5	29/8	9. Regulation of plasma K ⁺ concentration
		10. Regulation of plasma Ca ²⁺ concentration
6	5/9	11. Neuroendocrinology

		12. Regulation of plasma glucose concentration
7	12/9	Catch up lecture
		Mid-semester test in practical session

Study break: 19/9/16 – 3/10/16

8	3/10	13. Stress hormones
		14. The obesity epidemic and energy balance
9	10/10	15. Homeostatic control of appetite
		16. Reward systems and hedonic eating
10	17/10	17. Genetics of obesity
		18. Foetal effects and epigenetics
11	24/10	19. Protein and energy balance
		20. The microbiota
12	31/10	21. TBA
		22. TBA
13	7/11	no lecture
		no lecture

Internal Practical Timetable 2016

Wk	Practical
1	no practical
2	Introduction to BIOL76 and acid-base balance computer tutorial (calculator with logs needed for this prac) Organise seminar groups Discuss ethics and protocol for the acid base prac, organise subjects and sign consent forms
3	The effect of net acid or base ingestion on the pH and the hydrogen ion and bicarbonate excretion in the urine (lab coats)

4	Measurement of urine bicarbonate and analysis of acid base practical results
5	The effect of exercise on the cardiovascular system-planning and experimental
6	The effect of exercise on the cardiovascular system- experimental, data analysis and presentation (acid base assignment due 9/9 for internal students, 12/9 for external students)
7	Mid-semester test at 1 pm Thursday and 10 am Friday in prac

Study break: 19/9/16 – 3/10/16

8	Revision of the mid-semester test and case study ; seminar preparation (essay submission 4/10 internal and external students Saliva samples to Prasanth)
9	Student Seminars
10	Student seminars
11	Salivary cortisol (lab coats), lactose/fructose intolerance and case studies
12	Salivary cortisol results and revision session based on the 2013 exam paper
13	No practical

External Practical Timetable 2016

Practical sessions for external students will be held on Saturday 3rd & Sunday 4th September and on Thursday and Friday the 22nd & 23rd September. The classes start promptly at 9.00 am and will be held in F7B 110.

Saturday 3/9/2016	Thursday 22/9/2016
Introduction	Mid-semester test
Acid-base balance computer tutorial and discuss ethics and protocol for the acid base pracs, organise subjects and sign consent forms	Student seminars
The effect of net acid or base ingestion on the pH, hydrogen ion and bicarbonate excretion in the urine (lab coats)	Cortisol in the saliva
Sunday 4/9/2016	Friday 23/9/2016

Analysis of the acid base prac results	Analysis of cortisol results
Exercise and the cardiovascular system	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 Thursday, 22/9/2016.

If you have any questions or difficulties during the semester please do not hesitate to contact Julia by email (preferred) or come and see me.

Technology

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

New Assessment Policy in effect from Session 2 2016 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/

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

Disruption to Studies Policy 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/

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.m](#)

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

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

- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence

Assessment tasks

- Practical Assignment
- Mid-semester test
- Essay
- Seminar
- 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 outcomes

- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs
- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics and Biohazard Committees
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods and then to interpret the physiological significance of the results
- 8. Measure blood pressure in control and stressed subjects, the change in the chemical composition of urine from subjects ingesting acid or base, the diurnal rhythm of cortisol concentration in saliva, and the hydrogen produced by gut bacteria in exhaled breath

Assessment tasks

- Practical Assignment
- Essay
- Seminar
- Final 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

- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence

Assessment tasks

- Practical Assignment
- Essay
- Seminar
- Final exam

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 blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
- 8. Measure blood pressure in control and stressed subjects, the change in the chemical composition of urine from subjects ingesting acid or base, the diurnal rhythm of cortisol concentration in saliva, and the hydrogen produced by gut bacteria in exhaled breath

Assessment tasks

- Practical Assignment
- Mid-semester test

- Seminar
- 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 blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs
- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics and Biohazard Committees
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods and then to interpret the physiological significance of the results

Assessment tasks

- Practical Assignment
- Mid-semester test
- Essay
- Seminar
- 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 the components of the neural and endocrine systems that maintain energy balance in the human body
- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
- 4. Apply a critical approach to information and demonstrate the ability to develop a logical argument based on experimental evidence
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods and then to interpret the physiological significance of the results

Assessment tasks

- Practical Assignment
- Mid-semester test
- Essay
- Seminar
- 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 outcomes

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 5. Produce written work and oral presentations to the level expected by future employers or for progression into postgraduate programs
- 7. Collect experimental data accurately and analyse, graph and apply statistical methods

and then to interpret the physiological significance of the results

Assessment tasks

- Practical Assignment
- Mid-semester test
- Essay
- Seminar
- Final 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

- 1. Explain how the cardiovascular, renal and respiratory systems contribute to the maintenance of blood pressure and acid base balance in the body
- 2. Identify the components of the neural and endocrine systems that maintain energy balance in the human body
- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance
- 6. Carry out experiments using human subjects safely following protocols sanctioned by the Macquarie University Human Ethics and Biohazard Committees

Assessment tasks

- Practical Assignment
- Mid-semester test
- Seminar
- Final exam

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

- 3. Recognise that the controls of energy balance evolved for the fitness of ancestral hunter gatherers are no longer effective when highly appetising food is available in abundance

Assessment tasks

- Seminar
- Final exam

Changes from Previous Offering

The final exam in BIOL376 is now a hurdle requirement.

It is now University policy that 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.

Changes since First Published

Date	Description
11/07/2016	Staff added to the Unit Guide