BIOL257

Neurophysiology

S1 Day 2018

Dept of Biological Sciences

Contents

General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

15cp at 100 level including (BIOL108 and BIOL115) or ((BIOL108 or BIOL115) and (BBE100 or BIOL114 or BIOL116 or BIOL122 or COGS100 or HLTH108 or PSYC104))

Corequisites

Co-badged status

Unit description

This Unit considers the structure and function of the human nervous system. We begin with a discussion on how the selective permeability of the cell membrane gives rise to the electrical properties of cells, in particular nerve and muscle cells. We look in detail at the generation, propagation and transmission of neural signals, and examine the important principles of sensory physiology such as transduction, adaptation and stimulus coding. Students then study the anatomy and functional organization of the central and peripheral nervous systems. Having covered these basic principles, the Unit goes on to explore the somatosensory system, which is involved in proprioception and the perception of touch, pain and temperature. The nerves and organs that give rise to the special senses (vision, hearing, taste and smell) are also discussed. We next examine the structure and physiology of muscle cells, and the central control of motor functions. Lastly, we cover the autonomic nervous system and the neuroendocrine system, both of which regulate numerous physiological processes throughout the body.This unit is designed to serve science, medical science and chiropractic students, and is also of interest to students studying psychology with an emphasis on physiology.

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:

Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.

Explain how neural signals are generated, propagated and transmitted.

Identify the major structural features of the central and peripheral nervous systems.

Differentiate between the major functional subdivisions of the nervous system.

Summarise the diverse sensory receptors and sensory pathways found in the human body.

Explain how muscles work and how the nervous system coordinates motor activity.

Describe how the nervous system and endocrine system interact to regulate physiological processes.

Evaluate the scientific literature and summarise topics in a concise written format.

Collect experimental data and draw conclusions from simple analyses.

Interpret the results of simple tests of neural function on human subjects.

General Assessment Information

In order to pass this Unit, students must achieve an overall mark of 50% and attend at least 7 of the 10 different practical classes (excluding the mid-semester test and the revision session which are also held in the practical class slots).

Assessment Tasks

Name	Weighting	Hurdle	Due
Weekly Online Quizzes	10%	No	Weeks 1-5, 7-13
Critical Essay	15%	No	15 April
Mid-Semester Test	25%	No	Week 8
Final Exam	50%	No	TBA

Weekly Online Quizzes

Due: **Weeks 1-5, 7-13**

Weighting: **10%**

Each week, students will need to complete an online quiz (iLearn) based on the topics covered in that week's lectures.

On successful completion you will be able to:

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
- Explain how neural signals are generated, propagated and transmitted.
- Identify the major structural features of the central and peripheral nervous systems.
- Differentiate between the major functional subdivisions of the nervous system.
- Summarise the diverse sensory receptors and sensory pathways found in the human body.
- Explain how muscles work and how the nervous system coordinates motor activity.
- Describe how the nervous system and endocrine system interact to regulate physiological processes.

Critical Essay

Due: **15 April**
Weighting: **15%**

Students are required to submit a 1,500 word essay on a topic selected from a list provided on iLearn. The essay should discuss the topic critically with reference to the primary scientific literature. Essays submitted after the due date will score zero marks.

On successful completion you will be able to:

- Evaluate the scientific literature and summarise topics in a concise written format.

Mid-Semester Test

Due: **Week 8**
Weighting: **25%**

Internal students will sit this test (1.5hr) in their usual practical class slot. The test will comprise a mixture of multiple choice questions, objective questions and short answer questions. Questions will be on material covered in the lectures and practical classes from Weeks 1 to 7 inclusive.

On successful completion you will be able to:

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
- Explain how neural signals are generated, propagated and transmitted.
- Identify the major structural features of the central and peripheral nervous systems.

- Differentiate between the major functional subdivisions of the nervous system.
- Summarise the diverse sensory receptors and sensory pathways found in the human body.
- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Final Exam

Due: **TBA**
Weighting: **50%**

The final exam (2.5hr) will consist of 40 multiple choice questions and 6 short answer questions. The short answer questions will be split across two sections and students will need to select 3 out of the 4 short answer questions offered in each section. All lecture and practical/tutorial material is examinable.

On successful completion you will be able to:

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
- Explain how neural signals are generated, propagated and transmitted.
- Identify the major structural features of the central and peripheral nervous systems.
- Differentiate between the major functional subdivisions of the nervous system.
- Summarise the diverse sensory receptors and sensory pathways found in the human body.
- Explain how muscles work and how the nervous system coordinates motor activity.
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- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Delivery and Resources

Delivery Mode

This Unit will be delivered through:

1. Two (consecutive) 1 hour lectures per week (Weeks 1→5, 7→13; there is no lecture in Week 6 due to the Easter Monday holiday on 2 April)
2. One 3 hour laboratory-based practical class per week (Weeks 1→4, 6→13; there is no

practical in Week 5 due to the Easter Friday holiday on 30 March)

Practical/tutorial classes - Attendance requirements

- Practical/tutorial classes are compulsory and students must attend the class in which they have enrolled;
- To pass the unit, students must attend two thirds (i.e. 7 out of 10) of the different practical classes (excluding the mid-semester test and the revision session which are also held in the practical class slots). An attendance register will be held and must be signed by all students at the start of each practical class. Please note that signing for someone else is a breach of the Academic Honesty Policy and will be treated as such;
- There are usually 3 practical classes running simultaneously during each time slot. Students must enrol into one of the practical classes through eStudent;
- Students must not exchange their class slot. However, in special circumstances, students may request a specific change. These requests are to be submitted by emailing biol257@mq.edu.au

Class times and locations

Lectures

- Monday 14:00 - 16:00 in the Lotus Theatre (27 Wallys Walk)

Practical/tutorial classes

- Thursday 10:00 - 13:00 in F7B science labs (4 Wallys Walk) 102, 105 & 110
- Thursday 14:00 - 17:00 in F7B science labs (4 Wallys Walk) 102, 105 & 110
- Friday 10:00 - 13:00 in F7B science labs (4 Wallys Walk) 102, 105 & 110
- Friday 14:00 - 17:00 in F7B science labs (4 Wallys Walk) 102, 105 & 110

Required and recommended resources

Required resource

- BIOL257 Laboratory/practical class manuals - available through iLearn prior to each class

Recommended text

- Stanfield, C. L. (2016) "Principles of Human Physiology" (6th Edition). Pearson. ISBN: 9781292156484. Available through the Macquarie Co-Op Bookshop. The 5th Edition is also suitable.

Other recommended resources

- Hall, J. E. (2015) "Guyton and Hall Textbook of Medical Physiology" (13th Edition).

Philadelphia, USA; Saunders/Elsevier

- Vanderah, T. and Gould, D. (2016) "Nolte's The Human Brain: An Introduction to its Functional Anatomy" (7th Edition). London; Elsevier Health Sciences
- Details of any other relevant resources will be provided in lectures or posted on iLearn as appropriate Unit website
- All schedules, lecture material, laboratory/practical class manuals and other essential Unit information will be posted on iLearn (http://ilearn.mq.edu.au). iLearn should be checked regularly for any updates.

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). 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). 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 (https://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 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.

Note: 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/FSESupp) 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.

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

- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Assessment tasks

- Critical Essay
- 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 outcomes

- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Assessment tasks

- Critical Essay
- Mid-Semester Test
- 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 outcomes

- Evaluate the scientific literature and summarise topics in a concise written format.

- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Assessment tasks

- Critical Essay
- Mid-Semester Test
- 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

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
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- Differentiate between the major functional subdivisions of the nervous system.
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- Explain how muscles work and how the nervous system coordinates motor activity.
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- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
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Assessment tasks

- Weekly Online Quizzes
- Critical Essay
- Mid-Semester Test
- 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

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
- Explain how neural signals are generated, propagated and transmitted.
- Identify the major structural features of the central and peripheral nervous systems.
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- Critical Essay
- Mid-Semester Test
- 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

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
- Explain how neural signals are generated, propagated and transmitted.
- Identify the major structural features of the central and peripheral nervous systems.
- Differentiate between the major functional subdivisions of the nervous system.
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Assessment tasks

- Weekly Online Quizzes
- Critical Essay
- Mid-Semester Test
- 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

- Relate cellular physiology and the properties of cell membranes to the generation of membrane potentials.
- Explain how neural signals are generated, propagated and transmitted.
- Identify the major structural features of the central and peripheral nervous systems.
- Differentiate between the major functional subdivisions of the nervous system.
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Assessment tasks

- Weekly Online Quizzes
- Critical Essay
- Mid-Semester Test
- 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

- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Assessment tasks

- Critical Essay
- Mid-Semester Test
- 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 outcomes

- Evaluate the scientific literature and summarise topics in a concise written format.
- Collect experimental data and draw conclusions from simple analyses.
- Interpret the results of simple tests of neural function on human subjects.

Assessment tasks

- Critical Essay
- Mid-Semester Test
- Final Exam

Changes since First Published

Date	Description
24/01/2018	Added FSE comment about Supplementary exams and Special Consideration to Policy section