BIOL2230
Neurophysiology
Session 1, In person-scheduled-infrequent, North Ryde 2023
School of Natural Sciences

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General Information

Unit convenor and teaching staff
Kevin Danastas
kevin.danastas@mq.edu.au

Credit points
10

Prerequisites
50cp at 1000 level or above including [(BIOL2220 or BIOL247) or (20cp from (BIOL1110 or BIOL115) or (BIOL1210 or BIOL108) or (ANAT1001 or HLTH108) or (ANAT1002 or HLTH109) or (PSYU1104 or PSYC104 or PSYU1101) or (PSYU1105 or PSYC105 or PSYU1102) or (COGS1000 or COGS100))]

Corequisites

Co-badged status

Unit description
This Unit considers the structure and function of the nervous system. We begin with an overview of the functional organization of the central and peripheral divisions of the nervous system. We discuss how the selective permeability of the cell membrane gives rise to the electrical properties of excitable 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. Having covered these basic principles, the unit goes on to explore the somatosensory system, and 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 function. Lastly, we cover the autonomic nervous system and the neuroendocrine system, both of which regulate numerous physiological processes throughout the body.

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:

ULO1: Explain how neural signals are generated, transmitted and processed in different parts of the nervous system
ULO2: Understand how the nervous and endocrine systems interact
ULO3: Synthesise information taken from the scientific literature about the nervous system and present it to your peers in a concise format
ULO4: Assemble basic electrophysiology recording equipment and perform simple electrophysiological experiments
ULO5: Analyse and interpret the results of simple tests of neural function on human and/or invertebrate animal subjects

General Assessment Information

Requirements to pass this unit
To pass this unit, you must achieve a total mark equal to, or greater than, 50%.

Late Assessment Submission Penalty
Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of ‘0’ will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period will be provided to students who experience a technical concern.

For example, an assessment worth 20% is due 11:55 pm on 1 January. Student A submits the assessment at 10 pm, 3 January. The assessment received a mark of 18/20. A 10% deduction is then applied to the total possible mark (20), resulting in the loss of two (2) marks. Student A is then awarded a final mark of 16/20.

For any late submissions of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted:
Lab reports and scientific poster - YES, Standard Late Penalty applies
Online quizzes and mid-semester test - NO, unless special consideration is granted

Special Consideration
The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Online quizzes
The three quizzes are 20-minute online quizzes which you may do at home. Each quiz has 12
questions. Quiz questions can be multiple choice, short answer, fill in the blanks or calculations. Only one attempt at each quiz is allowed. Similar to the mid-semester test you will see only one question at a time. You will have only one chance to answer each question. You will answer questions sequentially. You may not go back in the quiz to correct any answers. Think carefully before answering and budget your overall time carefully. You will be expected to use correct spelling and grammar in your answers.

**Midsemester Test**
This test will include 35 quiz questions to be completed in 50 minutes. Any of the material covered in weeks 1-7 (lectures and practicals) may be included in the mid-semester test. Questions can be multiple choice, short answer, fill in the blanks or calculations. You must complete the test individually. During the test you will see only one question at a time. You will have only one chance to answer each question. You will answer questions sequentially. You may not go back in the quiz to correct any answers. Think carefully before answering and budget your overall time carefully. You will be expected to use correct spelling and grammar in your answers.

**Practical classes, lab reports and scientific poster**
Through your enrolment and personal timetable, you will be assigned a practical time slot and you are expected to attend all practical classes.

The details of each of the three lab reports and the scientific poster are in the practical notes which can be accessed through iLearn. The completed assignments must be submitted to Turnitin on the due dates given in the table above.

**Final exam**
The exam is a two hour paper with multiple choice questions, and short answer questions. All the lecture and practical material is examinable.

### Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quizzes</strong></td>
<td>9%</td>
<td>No</td>
<td>Consult iLearn for due dates</td>
</tr>
<tr>
<td><strong>Lab reports</strong></td>
<td>20%</td>
<td>No</td>
<td>Consult iLearn for submission dates</td>
</tr>
<tr>
<td><strong>Scientific poster</strong></td>
<td>6%</td>
<td>No</td>
<td>28th May 11:55pm</td>
</tr>
<tr>
<td><strong>Mid-Semester Test</strong></td>
<td>20%</td>
<td>No</td>
<td>30th April 11:55pm</td>
</tr>
<tr>
<td><strong>Practice Based task</strong></td>
<td>0%</td>
<td>No</td>
<td>Consult iLearn for classes</td>
</tr>
<tr>
<td><strong>Final Exam</strong></td>
<td>45%</td>
<td>No</td>
<td>S1 exam period</td>
</tr>
</tbody>
</table>
Quizzes
Assessment Type 1: Quiz/Test
Indicative Time on Task 2: 1 hours
Due: Consult iLearn for due dates
Weighting: 9%

These short online tests are designed to help you assess your progress in learning the unit content.

On successful completion you will be able to:
• Explain how neural signals are generated, transmitted and processed in different parts of the nervous system
• Assemble basic electrophysiology recording equipment and perform simple electrophysiological experiments
• Analyse and interpret the results of simple tests of neural function on human and/or invertebrate animal subjects

Lab reports
Assessment Type 1: Lab report
Indicative Time on Task 2: 18 hours
Due: Consult iLearn for submission dates
Weighting: 20%

You will prepare and submit lab reports based on lab activities that involve collection and analysis of neurophysiological data. These assessments link with lectures and other information sources and test your knowledge of the relevant neural systems.

On successful completion you will be able to:
• Explain how neural signals are generated, transmitted and processed in different parts of the nervous system
• Understand how the nervous and endocrine systems interact
• Synthesise information taken from the scientific literature about the nervous system and present it to your peers in a concise format
• Assemble basic electrophysiology recording equipment and perform simple
electrophysiological experiments
  • Analyse and interpret the results of simple tests of neural function on human and/or
invertebrate animal subjects

Scientific poster
Assessment Type 1: Poster
Indicative Time on Task 2: 2 hours
Due: 28th May 11:55pm
Weighting: 6%

You will be assessed on your ability to present a data set and synthesise information on a
neuroscience topic as a scientific poster presentation.

On successful completion you will be able to:
  • Synthesise information taken from the scientific literature about the nervous system and
present it to your peers in a concise format
  • Analyse and interpret the results of simple tests of neural function on human and/or
invertebrate animal subjects

Mid-Semester Test
Assessment Type 1: Quiz/Test
Indicative Time on Task 2: 1 hours
Due: 30th April 11:55pm
Weighting: 20%

The mid semester test will examine your knowledge of the concepts covered in lectures and lab
classes from Weeks 1 to 7 inclusive.

On successful completion you will be able to:
  • Explain how neural signals are generated, transmitted and processed in different parts of
the nervous system
  • Assemble basic electrophysiology recording equipment and perform simple
electrophysiological experiments
Practice Based task
Assessment Type 1: Practice-based task
Indicative Time on Task 2: 0 hours
Due: Consult iLearn for classes
Weighting: 0%

Demonstration of practical laboratory skills and knowledge of protocols, and the submission of practical tasks

On successful completion you will be able to:
  • Explain how neural signals are generated, transmitted and processed in different parts of the nervous system
  • Understand how the nervous and endocrine systems interact
  • Synthesise information taken from the scientific literature about the nervous system and present it to your peers in a concise format
  • Assemble basic electrophysiology recording equipment and perform simple electrophysiological experiments

Final Exam
Assessment Type 1: Examination
Indicative Time on Task 2: 2 hours
Due: S1 exam period
Weighting: 45%

The final exam will be an invigilated exam held during the Semester 1 Exam Period. The exam will use a mixture of multiple choice and short answer questions to evaluate your understanding of neurophysiological concepts presented in lectures and lab classes throughout the unit.

On successful completion you will be able to:
  • Explain how neural signals are generated, transmitted and processed in different parts of the nervous system
  • Assemble basic electrophysiology recording equipment and perform simple electrophysiological experiments
If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

Delivery and Resources

Recommended text
The textbook for this unit is "Principles of Human Physiology" by Cindy L Stanfield, published by Pearson. Available electronically through the 'Unit readings - Leganto' Block in iLearn.

Lectures
There will be two lectures each week. No in-person lectures for this unit. Each week's lectures will be made available through H5P. Lectures are often broken up into shorter chunks to make them easier to listen to, and are linked very closely to the text book material so the supporting reading is very clear. All lecture notes will be available in the week-by-week sections on iLearn.

Practical classes
Practical classes for all students will be taught face-to-face and will be on campus. They will be held in labs 102, 105 and 110 in building 4 Wally's Walk. For internal (frequent attendance) students, practicals will begin in week 2. Please refer to your personal timetable to identify the specific practical class you enrolled in. All notes and materials for the practical classes can be found in the Practicals block on iLearn.

Communication
We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to the general BIOL2230 mailbox, biol257@mq.edu.au, from your university email address.

COVID Information
For the latest information on the University’s response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: https://www.mq.edu.au/about/coronavirus-faqs. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Week begins</th>
<th>Lectures</th>
<th>Practical classes (room 102, 105, 110 4WW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Week</td>
<td>Date</td>
<td>Topics</td>
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| 1    | 20 February | L1 - Nervous System Overview  
                  | L2 - Anatomy of the Brain                                             |
| 2    | 27 February | L3 - Resting Membrane Potential  
                  | L4 - Receptors and Graded Potentials                                  |
| 3    | 6 March    | L5 - Action potentials and Nerve Conduction  
                  | L6 - Introduction to Electrophysiology                                |
| 4    | 13 March   | L7 - Neuronal Communication  
                  | L8 - Principles of Sensory Physiology                                 |
| 5    | 20 March   | L9 - Somatosensory System  
                  | L10 - Pain                                                            |
| 6    | 27 March   | L11 - Special Senses - Olfaction and Gustation  
                  | L12 - Special Senses - Hearing & Balance                              |
| 7    | 3 April    | L13 - Special Senses - Vision I  
                  | L14 - Special Senses - Vision II                                     |

**MIDSEMESTER BREAK**

External student practicals April 20 and 21
Prac 1 - Functional Anatomy  
Prac 2 - Action Potentials  
Prac 3 - Neuropharmacology  
Prac 4 - Somatosensory

| 8    | 24 April   | L15 - Muscle Physiology and Muscle Disorder  
                  | L16 – Smooth and Cardiac Muscle                                      |
|      |           | Mid-semester test (delivered as an at home online quiz)              |
| 9    | 1 May      | L17 – Motor Neurons and Reflexes                                     
                  | L18 – Upper Motor Neurons                                             |
| 10   | 8 May      | L19 – Cerebellum and Basal Ganglia  
                  | L20 - Neurodegenerative Disorders                                     |
|      |           | External student practicals May 13 and 14                           |
|      |           | Prac 5 - Sensory Thresholds: Taste and Smell                         |
|      |           | Prac 6 - Muscle Physiology                                           |
|      |           | Prac 7 - Vision & Hearing                                            |
|      |           | Prac 8 - Reflexes and Autonomic Nervous System                       |
| 11   | 15 May     | L21 - Autonomic Nervous System I                                     
                  | L22 - Autonomic Nervous System II                                    |
**Policies and Procedures**

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). 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
- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

**Student Code of Conduct**

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/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

**Academic Integrity**

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing an
Student Support
Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

The Writing Centre
The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support
Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study
- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues
- Student Advocacy provides independent advice on MQ policies, procedures, and processes

Student Enquiries
Got a question? Ask us via AskMQ, or contact Service Connect.

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.
### Changes since First Published

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/01/2023</td>
<td>Updated assessment due dates - original due date for the scientific poster was wrong</td>
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