

# **NEUR3221**

## **Neurophysiology**

Course Outline  
**Term 3, 2022**

School of Medical Sciences  
Faculty of Medicine & Health

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## 1. Staff

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Students wishing to see the course coordinators should make an appointment *via* email

## 2. Course information

Units of credit: 6

Pre-requisite(s): Physiology 1A (PHSL2101 or 2121 or 2501)

Teaching times and locations:

Online Lectures	available start of each week
Online Seminar (Q&A)	Wed 12- 1pm
Laboratory	Fri 10am – 1pm in Wallace Wurth 120
Tutorial	Fri 2-3pm or 3-4pm Mathews 103

<https://timetable.unsw.edu.au/2022/NEUR3221.html>

### 2.1 Course summary

The course leads students through the study of brain function from a cellular and synaptic level, through to a systems and functional level. Content includes cellular and synaptic neuroscience, and builds to investigate different aspects of sensory systems, and higher order brain processing and brain dysfunction. Teaching is structured around developing knowledge of nervous system physiology from a cellular to systems and functional approaches. Content is delivered by discipline experts, drawn from different research area, with teaching activities encompassing pre-recorded lectures, face-to-face tutorials, and practical classes. This course complements Molecular and Cellular Neuroscience (NEUR3121) which focuses on the structure and function of individual neurons and their ion channels and receptors. Students also find that this course complements Muscle and Motor Control (NEUR3101), Neuroanatomy (ANAT3411), and Neuropharmacology (PHAR3202).

### 2.2 Course aims

To gain an understanding of the principles of neurophysiology by:

- using molecular, synaptic, and cellular processes to explain brain function
- grasping the relationship between experimental techniques and the data they produce

### 2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. demonstrate knowledge of the scope of neurophysiology, and detailed knowledge in some areas including somatosensory system and synaptic plasticity.
2. apply basic physical and physiological principles to address questions related to brain and behaviour.
3. demonstrate critical enquiry by designing and executing a neurophysiological experiment.
4. describe the relationship between the experimental techniques that provide neurophysiological data, and the constraints on interpretation that the techniques impose.

## 2.4 Relationship between course learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Related Tasks & Assessment
CLO 1	Demonstrate knowledge of the scope of neurophysiology, and detailed knowledge in some areas including somatosensory system and synaptic plasticity.	Prelab Quizzes Midterm Exam End of Session Exam
CLO 2	Apply basic physical and physiological principles to address questions related to brain and behaviour.	Prelab Quizzes Midterm Exam End of Session Exam DIY Practical
CLO 3	Demonstrate critical enquiry by designing and executing a neurophysiological experiment.	DIY Practical
CLO 4	Describe the relationship between the experimental techniques that provide neurophysiological data, and the constraints on interpretation that the techniques impose.	End of Session Exam DIY Practical

## **3. Strategies and approaches to learning**

### **3.1 Learning and teaching activities**

The philosophy underpinning this course and its Teaching and Learning Strategies is based on “Guidelines on Learning that Inform Teaching at UNSW”. The teaching activities are centred on assisting students to achieve the course aims and learning objectives, in an environment which interests and challenges students. The teaching of Neurophysiology is structured around developing knowledge of brain function from a cellular to systems and functional approach. Content is delivered by discipline experts, drawn from different research areas.

Neurophysiology is delivered across 9 teaching weeks in Term 3, with teaching activities encompassing pre-recorded lectures, face-to-face tutorials, and practical classes. Together these comprise 6-7 hours of weekly activities. Lectures will provide you with the concepts and theories essential for an understanding of the course content. The practical classes assist in the development of research and analytical skills, and further learning of the key objectives. The skills you will learn in practical classes are relevant to your development as professional scientists. The tutorials are a mix of activities designed to review the materials and/or support the exploration of the material in more depth. These practical classes and tutorial classes allow students to engage in a more interactive form of learning than is possible in the lectures. Students are strongly recommended to allocate additional time for self-directed study, which includes revision for assessments and working on the group project task. Effective learning can also be enhanced through self-directed use of other resources such as textbooks, literature references and web-based sources.

### **3.2 Expectations of students**

Students are reminded that UNSW recommends that a 6 units-of-credit course should involve about 150 hours of study and learning activities. The formal learning activities total approximately 60 hours throughout the term and students are expected (and strongly recommended) to do at least the same number of hours of additional study.

Students are expected to engage in all scheduled activities (up to 4 hours of lectures / tutorials per week and up to 3 hours of practical sessions per week).

Attendance at laboratory and tutorial classes is compulsory. Satisfactory completion of the work set for each class is essential. It should be noted that non-attendance for other than documented medical or other serious reasons, or unsatisfactory performance, for more than one practical class or one tutorial class per course may result in an additional practical assessment exam or in ineligibility to pass the course.

## 4. Course schedule and structure

wk.		Lectures and Support modules	Practical	Tutorial
1	12/9	<b>Foundations: Introduction to nervous system function</b>		
		Neurons and Glia [GMT] Synaptic Transmission [JP] Recording and Stimulation Techniques [JP] Simple Neuronal Networks [JP]	Lab notebooks and experimental planning	Role of Glia in Disease
2	19/9	<b>Sensation and Neural coding</b>		
		Introduction to Sensation [JP] Peripheral Tactile / Central Tactile [RV] Neural Coding [RV]	<i>Psychophysics and Sensory neurophysiology</i>	<i>Neural Coding</i>
3	26/9	<b>Proprioception</b>		
		Kinaesthesia 1 Kinaesthesia 2	Kinaesthesia	Kinaesthesia
4	4/10	<b>Autonomic Neurophysiology</b>		
		Autonomic Nervous Systems Hypothalamic Control of Cardiovascular Function	Cockroach Sensory Nerve	TBD
5	10/10	<b>Pain and Peripheral Neuropathies</b>		
		Pain 1 Pain 2 Peripheral Neuropathy	Midterm Exam Optional self-directed activity (NeuVLab)	Pain tutorial
7	24/10	<b>Auditory Neurophysiology</b>		
		Introduction to Hearing: the Cochlea Central Auditory Pathways Cochlear Pathophysiology	Auditory Neurophysiology	Auditory tutorial
8	31/10	<b>Basal Ganglia and Decision Making</b>		
		Basal Ganglia and Decision Making Neuromodulation models of the basal ganglia Diseases of the basal ganglia	DIY Prac	Basal Ganglia Tutorial
9	7/11	<b>Memory and Plasticity</b>		
		Memory and Plasticity Memory and Plasticity II Memory and Plasticity III	DIY Prac	Memory and Plasticity
10	14/11	<b>Mental Health and Addiction</b>		
		Neurophysiology of addiction Neurophysiology of mental illness	DIY Prac - presentations	TBD

Exam Period: 25 November – 8 December

Supplementary Exam Period: 9 January – 13 January

## 5. Assessment

### 5.1 Assessment tasks

Assessment task	Weight	Due date and time
<b>Prelab quizzes (9)</b>	10%	Fridays 10 am (prior to prac)
<b>Midterm Exam (1-hour duration)</b>	25%	Friday 14 October 10 - 11am
<b>DIY practical</b>	25%	Proposal (25%): 31 October 9 am Lab Notebook (20%): 17 November 5 pm Poster Presentation (40%): 18 November 10 am Reflection (15 %): 18 November 5 pm
<b>End of Term Exam (2-hour duration)</b>	40%	Exam Period: 25 November – 8 December

Material pertaining to both the lectures, tutorial and practical classes will be examined in both the midterm and end of term exams.

Weekly **Prelab quizzes** will be available online. These quizzes, based on the lectures and prelab assignments, serve to test your comprehension of the concepts presented during the week and preparedness for the practical. You will receive immediate feedback after submitting your answers. The quizzes are to be attempted in your own time and each quiz will be close Fridays 10:00 am. You will have 3 attempts to complete the quiz, with the highest score recorded.

**The midterm exam** will be comprised of short answer questions, multiple choice and/or short calculations. The questions will be based on the material covered in the lectures, tutorials, and practical classes. The purpose of the exam is to provide feedback to students on their understanding and application of the concepts developed in the course and to prepare students for the final exam.

**The DIY practical.** Students will, in groups, research a topic, design, and execute their own neurophysiological practical experiment. Students will submit a preliminary proposal (group) on 31 October and a final presentation (group) on 18 November. On 18 November students will submit a reflection (individual).

**The end of term exam** will be comprised of short answer questions, multiple choice and/or short calculations that may include some simple calculations. The short answer questions will be based on the material covered in the lectures, tutorials, and practical classes. The exam is comprehensive; material covered in the mid-term exam may be again examined in the final exam. The lecturer who provided the question will mark the short answer questions. Students are advised to use the list of sample exam questions provided to self-evaluate their progress during the course.

#### Further information

UNSW grading system: <https://student.unsw.edu.au/grades>

UNSW assessment policy: <https://student.unsw.edu.au/assessment>



## 5.2 Assessment criteria and standards

Assessment criteria are available on Moodle.

## 5.3 Submission of assessment tasks

### Late Submission

UNSW has standard late submission penalties as outlined in the UNSW Assessment Implementation Procedure, with no permitted variation. All late assignments (unless extension or exemption previously agreed) will be penalised by 5% of the maximum mark per day (including Saturday, Sunday and public holidays). For example, if an assessment task is worth 30 marks, then 1.5 marks will be lost per day (5% of 30) for each day it is late. So, if the grade earned is 24/30 and the task is two days late the student receives a grade of 24 – 3 marks = 21 marks.

Late submission is capped at 5 days (120 hours). This means that a student cannot submit an assessment more than 5 days (120 hours) after the due date for that assessment.

### Special Consideration

If you experience a short-term event beyond your control (exceptional circumstances) that impacts your performance in a particular assessment task, you can apply for Special Considerations.

You must apply for Special Consideration **before** the start of your exam or due date for your assessment, except where your circumstances of illness or misadventure stop you from doing so.

If your circumstances stop you from applying before your exam or assessment due date, you must **apply within 3 working days** of the assessment, or the period covered by your supporting documentation.

More information can be found on the [Special Consideration website](#).

## 5.4. Feedback on assessment

**Weekly Prelab quizzes:** Students will receive feedback upon submitting their answers.

**The DIY practical:** Students will receive written feedback for each step of the assessment.

**The midterm and final exams:** Students will be provided with sample exam questions and model answers to self-evaluate their progress during the course.

## 6. Academic integrity, referencing and plagiarism

**Referencing** is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

See Moodle for referencing guidelines.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

*Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.<sup>1</sup> At UNSW, this means that your work must be your own, and others' ideas*

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<sup>1</sup> International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The Current Students site <https://student.unsw.edu.au/plagiarism>, and
- The ELISE training site <https://subjectguides.library.unsw.edu.au/elise>

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>.

## 7. Readings and resources

### TEXTBOOKS AND OTHER RESOURCES

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#### Prescribed Textbook

Neuroscience: Exploring the Brain. 4th edition, 2016  
Bear, Connors & Paradiso  
Williams & Wilkins, ISBN-13: 978-0781778176

#### Recommended Textbooks:

Neuroscience. 5<sup>th</sup> edition, 2012  
Purves, Augustine, Fitzpatrick, Hall, LaMantia & White  
Sinaur Associates ISBN 978-0-87893-695-3

Principles of Neural Science, 5<sup>th</sup> edition, 2012  
Kandel, Schwartz, Jessell, Siegelbaum & Hudspeth AJ (Editors)  
McGraw-Hill. ISBN 978-0071390118  
[An advanced textbook for extended reading. Copies held in the UNSW library]

The books are available from the UNSW Bookshop, and limited copies are held by the UNSW library.

Other resources:

[medicalsciences.med.unsw.edu.au/students/undergraduate/learning-resources](https://medicalsciences.med.unsw.edu.au/students/undergraduate/learning-resources)

## 8. Administrative matters

Student enquiries should be submitted via student portal <https://portal.insight.unsw.edu.au/web-forms/>

## 9. Additional support for students

- The Current Students Gateway: <https://student.unsw.edu.au/>
- Academic Skills and Support: <https://student.unsw.edu.au/academic-skills>
- *Student Wellbeing and Health* <https://www.student.unsw.edu.au/wellbeing>
- UNSW IT Service Centre: <https://www.myit.unsw.edu.au/services/students>
- *UNSW Student Life Hub*: <https://student.unsw.edu.au/hub#main-content>
- *Student Support and Development*: <https://student.unsw.edu.au/support>
- *IT, eLearning and Apps*: <https://student.unsw.edu.au/elearning>
- *Student Support and Success Advisors*: <https://student.unsw.edu.au/advisors>
- *Equitable Learning Services (Formerly Disability Support Unit)*: <https://student.unsw.edu.au/els>
- *Transitioning to Online Learning* <https://www.covid19studyonline.unsw.edu.au/>
- *Guide to Online Study* <https://student.unsw.edu.au/online-study>