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Faculty of Medicine
School of Medical Sciences

NEUR 3221

Neurophysiology

COURSE OUTLINE

TERM 2, 2020

CRICOS Provider Code 00098G

CONTENTS **Page**

Please read this outline in conjunction with the following pages on the School of Medical Sciences website:

- Advice for Students
- Learning Resources

(or see "STUDENTS" tab at medicalsciences.med.unsw.edu.au)

NEUR3221 Course Information

Neurophysiology (NEUR3221) is a stage three course worth six units of credit (6 UOC) administered by the School of Medical Sciences. It is delivered across 10 teaching weeks in term 2, with seven contact hours per week. NEUR3121 can be undertaken upon successful completion of Physiology 1A (PHSL2101 / 2121 / 2501). The course can contribute to a study plan in Physiology or Neuroscience for the Bachelor of Science or Bachelor of Medical Sciences.

In 2020, Neurophysiology (NEUR3221) will commence in the week beginning 1 June.

The content of the course provides an understanding of how cells in the nervous system work together to perform various functions. 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).

OBJECTIVES OF THE COURSE

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

COURSE CO-ORDINATOR and LECTURERS

Course Coordinator:

Dr John Power
Rm 303 Wallace Wurth Building
john.power@unsw.edu.au

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

Lecturers in this course:

Prof Bernard Balleine	bernard.balleine@unsw.edu.au
Dr. J Bertran-Gonzalez	j.bertran@unsw.edu.au
A/Prof Pascal Carrive	p.carrive@unsw.edu.au
Dr. Nathan Fiore	n.troyfiore@unsw.edu.au
Dr. Martin Héroux	m.heroux@neura.edu.au
Prof Gary Housley	g.housley@unsw.edu.au
Dr. Natasha Kumar	natasha.kumar@unsw.edu.au
A/Prof Gila Moalem-Taylor	gila@unsw.edu.au
Dr. Terry Trinh	terry.trinh@sydney.edu.au
A/Prof Richard Vickery	richard.vickery@unsw.edu.au

COURSE STRUCTURE and TEACHING STRATEGIES

Learning activities are timetabled for the days and times below

- Lectures: Tuesday 1 - 3 pm, Thursday 2 - 3 pm
- Practicals: Friday 9 am - 12 pm
- Tutorials: Friday 12 - 1 pm or 1 - 2 pm

Due to covid-19, all learning activities will be available online. Lectures will be pre-recorded and made available at the start of the week. An online review / question and answer session will be held during the Thursday's lecture timeslot or the tutorial timeslot. Practical sessions will be partially self-directed with an interactive session / wrap up held during the prac timeslot. Weekly tutorials activities will occur online during the scheduled timeslots.

Students are expected to engage in all scheduled activities (4 hours of lectures / tutorials per week and up to 3 hours of practical sessions per week). 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 are approximately 72 hours throughout the term and students are expected to do at least the same number of hours of additional study.

Lectures will provide you with the concepts and theory essential for an understanding of neurophysiology. To assist in the development of research and analytical skills practical classes and tutorial learning sessions will be held. These classes allow students to engage in a more interactive form of learning than is possible in the lectures. The skills you will learn in practical classes are relevant to your development as professional scientists.

Support for online learning can be found here:

- Transitioning to Online Learning https://www.covid19studyonline.unsw.edu.au/
- Guide to Online Study https://student.unsw.edu.au/online-study
- UNSW Student Life Online https://student.unsw.edu.au/help#main-content

APPROACH TO LEARNING AND TEACHING

The learning and teaching philosophy underpinning this course is centred on student learning and aims to create an environment which interests and challenges students. The teaching is designed to be engaging and relevant to prepare students for future careers.

Although the primary source of information for this course is the lecture material, effective learning can be enhanced through self-directed use of other resources such as textbooks and Web based sources. Your practical classes will be directly related to the lectures and it is essential to prepare for practical classes before attendance. It is up to you to ensure you perform well in each part of the course; preparing for classes; completing assignments; studying for exams and seeking assistance to clarify your understanding.

TEXTBOOKS AND OTHER RESOURCES

Prescribed Textbook

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

Recommended Textbooks:

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

Principles of Neural Science, 5th 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

STUDENT LEARNING OUTCOMES

Specific Learning outcomes:
By the end of this course students are expected to:

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

Faculty of Science and UNSW graduate attributes are found at:
medicalsciences.med.unsw.edu.au/students/undergraduate/advice-students#graduate

COURSE EVALUATION AND DEVELOPMENT

Each year feedback is sought from students about the course and continual improvements are made based on this feedback. Below is a summary of the feedback and our response to how we will improve this year's course delivery.

Student Feedback from myExperience and Class Representatives:
Student feedback indicated the best aspects of the course were the thematic structure, range of themes, interactive lab sessions, and foundation lectures. Suggestions for improving the course included: an online introduction to each theme to support students that have no previous exposure to the topic.

Outcomes of end of term course review:
Feedback from students was considered when the course was reviewed at the end of the year. We have responded to the feedback by:

1. Increasing the amount of foundation material available online
2. Adding an online introduction to each theme.

Student Representatives
Students enrolled in the course will be invited to elect student representatives who will meet with the course conveners on two occasions during the term, in a student feedback forum. The representatives need to seek feedback from their colleagues on the content, delivery and relevance of the course and any other issues that arise. The information gathered from this process will be used to inform any future improvements to the course.

ASSESSMENT PROCEDURES

Weekly quizzes (9)	10%
Midterm Exam	25%
DIY practical	25%
End of Term Exam (2 hour duration)	40%

A penalty will apply for late submissions of assessment tasks (10% per day).

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

Weekly quizzes will be available online Friday, after the tutorial sessions. These quizzes based on the lecture, prac and tutorial content serve to test your comprehension of the concepts presented during the weeks. **Students must submit prac and tutorial worksheets prior to attempting the quiz.** 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 on Monday 11:59 pm. 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 13 July and a final report on 3 August.

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 previous exam questions provided to self-evaluate their progress during the course, although questions from year to year may vary as the content of the course is developed.

GENERAL INFORMATION

The Department of Physiology is part of the School of Medical Sciences (SoMS) located in the Wallace Wurth building, and is within the Faculty of Medicine. General inquiries regarding courses coordinated by SoMS should be submitted via the UNSW Student Portal Web Forms: http://unsw.to/webforms.

Honours. The School of Medical Sciences and the School of Psychology jointly run the Neuroscience Honours program coordinated by Dr Natasha Kumar natasha.kumar@unsw.edu.au. In addition, the School of Medical Sciences Honours also offers a program is coordinated by A/Prof Cristan Herbert, c.herbert@unsw.edu.au .

Any students considering an Honours year should discuss the requirements with the coordinator. Please see:
Neuroscience:
medicalsciences.med.unsw.edu.au/students/undergraduate/neuroscience/honours

SoMS:
medicalsciences.med.unsw.edu.au/students/soms-honours/overview

Postgraduate research degrees
The School of Medical Sciences offers students the opportunity to enter a Masters (MSc) or Doctorate (PhD) program in Physiology. It is available on the 'Students' menu item of the SoMS website.
https://medicalsciences.med.unsw.edu.au/students/postgraduate-research/overview

Attendance Requirements

For details on the Policy on Class Attendance and Absence see Advice for Students and the Policy on Class Attendance and Absence.
Guidelines on extra-curricular activities affecting attendance can be found here.

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.

Special Consideration

Please see UNSW-Special Consideration and Student Advice-Special Consideration

The supplementary exam for Term 2, 2020 will be held from 7 September to 11 September 2020.

If you unavoidably miss an exam in NEUR3221, you must lodge an online application in myUNSW for special consideration. If your request for consideration is granted an alternative assessment will be organised which may take the form of a supplementary exam or increased weighting of the final exam.

Academic Integrity and Plagiarism

The UNSW Student Code outlines the standard of conduct expected of students with respect to their academic integrity and plagiarism. More details of what constitutes plagiarism can be found here.

Practical Classes

The practical class is an opportunity for students to develop graduate attribute 3 by behaving in an ethical, socially responsible and professional manner within the practical class. **All structured practical classes will be held online. The practical sessions will be largely self-directed with an interactive session / wrap up held during the prac timeslot.**

All pracs, including student directed pracs, can be taken remotely. Currently, due to Covid-19 restrictions, students are unable to access the physiology labs in the Wallace Wurth Building. If it becomes possible for students to access the practical laboratories, students choosing to access the practical must take due care with biological and hazardous material and make sure all equipment is left clean and functional. In the interests of safety, special attention should be paid to any precautionary measures recommended in the notes. If any accidents or incidents occur, they should be reported immediately to the demonstrator in charge of the class who will record the incident and recommend what further action is required.

For more details see Advice for Students-Practical Classes

SCHEDULE

Week 1: Foundations: Introduction to nervous system function

Lecture and Support Modules

- Neurons and Glia
- CNS Structure & Function
- Synaptic Transmission
- Recording and Stimulation Techniques

Practical

- **Introduction Neurophysiology Laboratories**

Tutorial

- Role of Glia in Disease

Week 2: Neural coding and communication

Lecture and Support Modules

- Introduction to Sensation
- Simple Neuronal Networks
- Neural Coding

Practical

- Tactile psychophysics lab

Tutorial

- Dissecting Neural circuits

Week 3: Tactile Neurophysiology

Lecture and Support Modules

- Peripheral Tactile
- Central Tactile
- Neural Prosthetics

Practical

- Sensory nerve recording

Tutorial

- Neural coding tutorial

Week 4: Pain and Peripheral Neuropathies

Lecture and Support Modules

- Mechanisms and Modulation
- Peripheral Neuropathy
- Pain – Clinical Implications

Practical

- NeuVLab

Tutorial

- Pain tutorial

Week 5: Proprioception

Lecture and Support Modules

- Kinaesthesia I
- Kinaesthesia II

Practical

- DIY

Tutorial

- Kinaesthesia tutorial

Week 6: No Class

Week 7: Auditory Neurophysiology

Lecture and Support Modules

- Introduction to Hearing: the Cochlea
- Central Auditory Pathways
- Cochlear Pathophysiology

Practical

- Auditory Neurophysiology

Tutorial

- Auditory tutorial

Week 8: Wiring and Re-wiring the Nervous System

Lecture and Support Modules

- Neuro-development
- Memory and Plasticity
- Memory and Plasticity II

Practical

- DIY

Tutorial

- Addiction

Week 9: Basal Ganglia and Decision Making

Lecture and Support Modules

- Basal Ganglia and Decision Making
- Neuromodulation models of the basal ganglia
- Diseases of the basal ganglia

Practical

- DIY

Tutorial

- Basal Ganglia Tutorial

Week 10: Basal Ganglia and Decision Making

Lecture and Support Modules

- Autonomic Nervous System
- Hypothalamic Control of Cardiovascular Function
- TBD

Practical

- No prac

Tutorial

- Exam review

ASSESSMENT TASKS

Task	Due Date
Weekly quizzes (9)	Weekly (Mondays)
Midterm Exam	2 July
Final Exam	14 August to 27 August
Preliminary Student Designed Prac - Part 1	13 July
Preliminary Student Designed Prac - Part 2	3 August
Student Designed Prac (Reflection and Peer Review)	7 August