UNSW AUSTRALIA | Medical Sciences Medicine

DEPARTMENT OF PHYSIOLOGY

NEUROPHYSIOLOGY

NEUR3221

SESSION 2, 2015

COURSE OUTLINE

CRICOS Provider Code 00098G

Contents

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

- Advice for Students
- Learning Resources

COURSE STAFF

Course Coordinators

Course Coordinator
Dr. John Power
303 Wallace Wurth Building
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Course co-Coordinator
Dr. Jennie Cederholm
Translational Neuroscience Facility
Level 3 Wallace Wurth Building
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e-mail j.cederholm@unsw.edu.au

Consultations

Dr Power is responsible for all academic and administrative matters regarding the course. Students should feel free to approach him with any questions or problem concerning the course either before or after scheduled class activities. Outside of these times, students are strongly encouraged to arrange an appointment in advance by email. In Dr. Power's absence, enquiries can be directed to Dr Jennie Cederholm.

Other information of an administrative nature may also be obtained from the combined Student Office for SOMS, BABS, BEES (Room G27, Biosciences Building). This is also where reports are turned in.

Other Teaching Staff

Prof Gary Housley	g.housley@unsw.edu.au
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COURSE INFORMATION

Course Structure

Units of credit: This course is worth 6 units of credit.

Contact hours: The course structure is:

- Three x 1 hour lectures (or tutorials) per week.
- One x 3 hour practical class (or tutorial) per week.

Practical Class assignment:
Students are enrolled in a single practical class. Students will be split into two practical groups (A & B). Groups will be assigned during the first lecture.

Class Times and Locations:

The course runs on Monday, Tuesday, Wednesday and Friday.

Lectures run for 1 hour will be held at: 9 am on Monday in Wallace Wurth LG03, 5 pm on Tuesday in Wallace Wurth LG02 and 12 noon on Friday in the Wallace Wurth LG03.

Practical classes will run on Wednesdays from 9 – noon in either room 120 or G16/17 of the Wallace Wurth Building.

Course schedule

The course timetable is included at the end of this section (page 9). Any updates to the timetable will be announced in lectures and on Moodle.

Approach to Learning and Teaching

The philosophy underpinning this course and its Teaching and Learning Strategies is based on "Guidelines on Learning that Inform Teaching at UNSW". These guidelines may be viewed at: www.guidelinesonlearning.unsw.edu.au. The teaching of neurophysiology covers both the physiology of neurons and brain function, and how these data were derived, as a full understanding of neurophysiology requires an appreciation of both what is known and of the limitations imposed by our study tools.

Lectures will provide you with the concepts and theory essential for understanding neurophysiology. The practical classes will assist you in the development of research and analytical skills. The practical classes are relatively small and not too tightly structured, so they allow you to engage in more interactive learning than is possible in lectures.

Although the primary source of information for this course is the material delivered in lectures and practical classes, effective learning can be enhanced through self-directed use of other resources such as textbooks. 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.

Aims 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

Student Learning Outcomes

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

- a demonstrable knowledge of the scope of neurophysiology, and detailed knowledge in some areas including somatosensory system and synaptic plasticity.
- experience in applying basic physical and physiological principles to resolve questions related to brain and behaviour.
- experience and expertise in critical enquiry by designing and executing a neurophysiological experiment.
- by practical experience and critical review, an appreciation of the relationship between the experimental techniques that provide neurophysiological data, and the constraints on interpretation that the techniques impose.

Faculty of Science Graduate Attributes:
Within the Faculty of Science we have developed a set of attributes for all our Science Programs. This was developed taking into consideration the UNSW Graduate attributes at the time:

1. **Research, inquiry and analytical thinking abilities.**
   Lectures will introduce advanced concepts in Neurophysiology. Your understanding of this advanced disciplinary knowledge is assessed by the two progress tests during the session and the end of course exam. Your competence is developed through the supporting laboratory and tutorial session, which require application of these concepts to new situations. The DIY prac also provides the opportunity to demonstrate competence in critical analysis, research and inquiry.
2. **Capability and motivation for intellectual development.**
   The laboratory classes support intellectual development in the concepts of neurophysiology. The activities have an open ended structure that provides an opportunity for creative, curiosity driven learning. You will be responsible for designing and executing your own experiment. This task offers an opportunity to demonstrate commitment to your own learning while exploring your own interests. The research plan and prac report will assess your capacity for creativity, critical analysis and entrepreneurship.
3. **Ethical, Social and Professional Understanding.**
   Students are expected conduct their prac experiments in an ethical manner, treating tissue, animals or participants with respect and appreciation. Prac work is to be conducted in teams. The research plan and prac reports are a group assignments and your mark will depend on your ability to work together to achieve a common goal.
4. **Communication.**
   You will have the opportunity to develop your written communication skills as part of the group project. Your ability to communicate scientific data will be assessed by the prac report.
5. **Teamwork, collaborative and management skills.**
   The DIY project requires strong collaborative effect to achieve the common goal. Collaborative activities in the earlier will provide an opportunity to develop teamwork skills.
6. **Information literacy.**
   The DIY research plan and prac report will require you to search the scientific literature to find appropriate information for the assessed documents. While these skills are not formally assessed, the ability to make appropriate and effective use of these skills will contribute to your success in achieving the goals of the group project.

ASSESSMENT

Assessment tasks

Online quizzes (x2)	5%
Progress Test 1 (50 minute duration)	15%
Progress Test 2 (50 minute duration)	15%
DIY experimental plan – risk assessment - SWP	5%
DIY prac report	20%
Final exam (2 hour duration)	40%

Material pertaining to the both the lectures and practical classes will be examined in both the progress tests and the final exam.

You must complete two multiple choice quizzes online. Questions are similar to those on the progress tests and final exam. The quizzes will go up on Moodle on the Monday of week 4 (17/8) and the Monday of week 8 (14/9) and will be taken down after the progress test. You must complete these quizzes by the due date to receive credit. They will be made available a few days before the exams for revision purposes. Together, the quizzes will contribute **5%** to your final mark for the course (2.5% each). You will receive the full 5% if you correctly complete all questions on both quizzes. **You may attempt the quiz as many times as you like in order to achieve a perfect score of 100% correct.**

There will be two progress exams throughout the course. These exams 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 and practical classes. The purpose of these progress exams 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, design and complete their own neurophysiology practical. Each group is to submit their experimental design, a risk assessment and safe work procedure via Moodle, prior to the mid-term break (25/9). The prac report is due Wednesday the 28th of October. Please see the DIY report guidelines on page 6 of this manual. Additional details will be provided at during the term.

The end of session 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 and practical classes. Material covered in the progress exams 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.

Do-It-Yourself (DIY) Practical

Design your own practical and further explore topics of interest

Your group must design and then complete a practical of your own. The aim of this exercise is to give you experience in designing a good scientific experiment and allowing you to further explore topics of interest. Groups will have access to most of the equipment in the physiology labs including that from previous practicals. Prior to undertaking the DIY prac you will need to submit a research plan for your experiment. The experimental plan consists of a 400-500 word background and an outline of your experimental design. The group will also need to complete a risk assessment and develop a safe work procedure (SWP).

The background provides the context and rationale for the experiment and research plan. It should introduce the topic, briefly review current knowledge, and indicate the gap in knowledge that your experiment aims to address. Briefly state the research question that your experiment will address and provide a hypothesis. At least 2 papers on the topic, including at least one research paper, need to be cited in the introduction. Introductions will be assessed on the clarity of thinking (logical consistency, thoroughness, etc.) and clarity of expression (clear sequencing, and presentation of information).

The experimental design is an outline of the structure of the experiment and should indicate the techniques used to answer your research question. Indicate the number and type of subjects, the experimental and control conditions, the equipment required, the type data that will be collected, how the data will be quantified, and the type of statistical analysis that will be used. The use of flow charts or tables to explain the experimental design is recommended. Indicate what you expect to happen if your hypothesis is correct.

The DIY practical will take place in weeks 10 & 11 during the normal practical time. **Your experimental design including the Risk Assessment and Safe Work Procedure must be approved prior to commencing the experiments.**

The Practical Report contribute 20% to your final mark for the course (10%) for the Introduction, Method, and Results section and 10% for the Discussion section. The group will submit a single document for the introduction, method, and results. Each student will submit their own discussion. Document guidelines will be distributed during the term.

Marks will be based on the clarity of thinking (logical consistency, thoroughness, etc.) and clarity of expression (clear sequencing, and presentation of information) demonstrated in the report. The data obtained are important in terms of how you present them, and how they are discussed; this means that “wrong” results you may have obtained are perfectly acceptable provided you present them clearly, and discuss what may have to lead to these results.

The DIY report will be due on **Wed the 28th October at 4pm**. Reports submitted after this time will lose 3% from the grade per day. Reports can be submitted any time before the deadline.

CONTINUAL COURSE IMPROVEMENT

Feedback from students about this course is one of the main ways of ensuring the continual development and improvement of this course. We invite students to provide online anonymous course evaluation to academic staff via Moodle throughout the session to enable immediate feedback. The end-of-session Course and Teaching Evaluation and Improvement [CATEI] process of UNSW is another way in which student feedback is evaluated, and we ask for your assistance in completing this survey at the appropriate time. Part of the CATEI process is to communicate significant changes to the course to subsequent cohorts of students.

In response to student feedback from 2014, students will be given greater guidance in the design and implementation of the DIY practical through additional pracs / tutorial sessions. These pracs are designed to hone experimental design and data analysis skills and held in the computer lab (WW G16/G18) so that every group member has access to a lab computer.

ADMINISTRATIVE INFORMATION

See also Advice for Students:

MEDICALSCIENCES.MED.UNSW.EDU.AU/STUDENTS/UNDERGRADUATE/ADVICE-STUDENTS

General Information

The Department of Physiology is part of the School of Medical Sciences and is within the Faculty of Medicine. It is located in Wallace Wurth building (C27). General enquiries can be made at the School of Medical Sciences Reception: Room 255, level 2 of the Wallace Wurth building (office hours are 9.00 am - 5:00 pm).

Professor Gary Housley is Head of the Department of Physiology and appointments to see him may be made through his Administrative Assistant Ms Chris Riordan on 9385 2804.

There are two honours programs available through the School of Medical Sciences. The School of Medical Sciences Honours program is coordinated by Dr Thomas Fath t.fath@unsw.edu.au. In addition, the School of Medical Sciences and the School of Psychology jointly run the Neuroscience Honours program which is coordinated by Dr John Power john.power@unsw.edu.au. Any students considering an Honours year should discuss the requirements with the coordinator. Outstanding students may be considered for scholarships offered by the University and School. Please see:

SoMS

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Neuroscience

MEDICALSCIENCES.MED.UNSW.EDU.AU/STUDENTS/UNDERGRADUATE/NEUROSCIENCE/HONOURS

Postgraduate research degrees: The School of Medical Sciences offers students the opportunity to enter into a Masters (MSc) or Doctorate (PhD) program in Physiology. For further information contact the Postgraduate Coordinator, Dr David Simar d.simar@unsw.edu.au. Please see:

MEDICALSCIENCES.MED.UNSW.EDU.AU/STUDENTS/POSTGRADUATE-RESEARCH/OVERVIEW

Summer research awards: The School of Medical Sciences supports several summer vacation scholarships each year to enable good students to undertake short research projects within the school. Please see:

MEDICALSCIENCES.MED.UNSW.EDU.AU/STUDENTS/UNDERGRADUATE/SUMMER-RESEARCH-AWARDS

The School Student Adviser is able to provide additional information on any courses offered by the School. Please contact Carmen Robinson (9385 2464) or (carmen.robinson@unsw.edu.au).

RESOURCES FOR STUDENTS

Textbooks

Prescribed Textbook

Neuroscience: Exploring the Brain. 4th edition, 2015
Bear, Connors & Paradiso
Williams & Wilkins, ISBN 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 may be found at:
MEDICALSCIENCES.MED.UNSW.EDU.AU/STUDENTS/UNDERGRADUATE/LEARNING-RESOURCES

TENTATIVE TIMETABLE

Wk	Week starting	MONDAY (9 – 10 am) Lecture – WW LG03	Tuesday (5 – 6 pm) Lecture - WW LG02	Friday (noon – 1 pm) Lecture - WW LG03	Prac Group A	Prac group B
1	27/7	Course Overview [Power - Cederholm]	Introduction to Systems Neuroscience [Power]	Simple Neuronal Networks [Power]	**NO PRAC**	**NO PRAC**
2	3/8	Auditory Nervous System I [Cederholm]	Auditory Nervous System II [Housley]	Recording Techniques [Power]	PRAC-1A – Auditory [Housley, Cederholm]	Simple Network Simulation [Power]
3	10/8	Auditory Nervous System III [Housley]	Auditory Nervous System IV [Housley]	The Visual System [Power]	Simple Network Simulation [Power]	PRAC-1B – Auditory [Housley, Cederholm]
4 Online Quiz	17/8	Kinaesthesia I [Walsh]	Kinaesthesia II [Walsh]	Pre-test Tutorial	PRAC-2A – kinaesthesia [Walsh]	Experimental Design & data analysis [Power]
5	24/8	**Progress Test 1**	Post-test Tutorial	Neural Coding [Vickery]	Experimental Design & data analysis [Power]	PRAC-2B – kinaesthesia [Walsh]
6	31/8	Peripheral Tactile [Vickery]	Central Tactile [Vickery]	Pain [Moalem-Taylor]	PRAC-3A Neuronal Activity [Vickery +2 casuals]	Proposals, RAs & SWPs [Power]
7	7/9	Chemical Control of Brain Behaviour [Power]	CNS Development [Shannon Weickert]	Memory Systems [Power]	Proposals, RAs & SWP [Power]	PRAC-3B Neuronal Activity [Vickery]
8 Online Quiz 2	14/9	Memory & Synaptic Plasticity [Power]	Special Lecture Professor Bita Moghaddam University of Pittsburgh	Memory & Network Plasticity [Power]	PRAC-4A – Somatosensory [Vickery]	Statistics [Power]
9	21/9	Motivation and Addiction [Klugmann]	Pre-test Tutorial	**Progress Test 2 DIY Plan Due**	Statistics [Power]	PRAC-4B –Somatosensory [Vickery]
Midsession Break						
10	5/10	LABOUR DAY	Neurobiology of Mental Illness [Shannon Weickert]	Glia [Klugmann]	DIY Prac [Power - Cederholm]	DIY Prac [Power - Cederholm]
11	12/10	Clinical Neurophysiology I [Kwai]	Clinical Neurophysiology II [Klugmann]	Tutorial	DIY Prac [Power - Cederholm]	DIY Prac [Power - Cederholm]
12	19/10	Neural Stimulation [Vickery]	Neural Prosthetics [Vickery]	Pre-final tutorial	**NO PRAC**	**NO PRAC**
13	26/10	TBD	No class	No class	**DIY Prac Report Due**	**DIY Prac Report Due**