



Australia's  
Global  
University

Faculty of Medicine  
School of Medical Sciences

# NEUR4421

## Biomedical Perspectives in Neuroscience

COURSE OUTLINE

TERM 2, 2020

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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 [medicallsciences.med.unsw.edu.au](http://medicallsciences.med.unsw.edu.au) )

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## NEUR4421 Course Information

This course offers workshops on specific current 'hot topic' issues in biomedical neurobiology, where you will be exposed to the latest research. Due to COVID-19, this course will be offered fully online in 2020. Virtual labs will give you real insight into modern neuroscience techniques, their correct implementation and their limitations. It is designed specifically for Neuroscience Honours students.

(NEUR4421) is worth six units of credit (6 UOC) administered by the School of Medical Sciences. It is delivered across 9 teaching weeks in Term 2.

## OBJECTIVES OF THE COURSE

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- To develop the students' theoretical knowledge base in biomedical neuroscience.
- To develop the students' capacity for critical analysis of the primary literature.
- To develop the students' ability to concisely present scientific data.
- To develop the students' ability to communicate scientific research to a lay audience.

## COURSE CONVENORS

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Dr Natasha Kumar  
Phone: 9385 1713  
Email: [natasha.kumar@unsw.edu.au](mailto:natasha.kumar@unsw.edu.au)  
Room: Level 3E, Wallace Wurth

Dr John Power  
Phone: 9385 2910  
Email: [john.power@unsw.edu.au](mailto:john.power@unsw.edu.au)  
Room: Level 3SW, Wallace Wurth

A/Prof Gila Moalem-Taylor  
Phone: 9385 2478  
Email: [gila@unsw.edu.au](mailto:gila@unsw.edu.au)  
TNF. Level 3SW. Wallace Wurth

Dr Jason Potas  
Phone: 9385 0017  
Email: [j.potas@unsw.edu.au](mailto:j.potas@unsw.edu.au)  
Room: Level 2E, Wallace Wurth

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## **COURSE STRUCTURE**

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The course is structured as a series of workshops. Two half-day workshops focus on professional skills (communication, statistical inference, career development). All students attend these workshops. In addition, students will be allocated to 2 research themed elective workshops. The research themed workshops (~8 contact hours per workshop) include lectures, journal article presentations, and virtual lab activities related to a specific biomedical research topic.

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## **APPROACH TO LEARNING AND TEACHING**

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Neuroscience is conceived of as a core field of knowledge to which many different disciplines contribute. Neuroscience is primarily an experimental discipline and so a proper appreciation of neuroscience requires an understanding of both what is known, and of the limitations imposed by our study tools. This course exposes student to the diverse range of disciplines, techniques and thoughts in modern neuroscience.

The lectures by discipline experts will cover the scope and range of approaches in neuroscience and provide the students with a broad base of knowledge from which to appreciate neuroscientific developments. The seminar presentations will encourage students to engage with this material on a deeper level. Working in small groups to present recent research findings will help develop teamwork skills.

The virtual laboratory/tutorial exercises will give students an appreciation of applications of neuroscience and will enable them to learn while doing. The essay assessment addresses non-scientific issues frequently encountered in the field of modern neuroscience.

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## **STUDENT LEARNING OUTCOMES**

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By the end of this course students are expected to:

1. Demonstrate a broad understanding of a body of knowledge and theoretical concepts.
  2. Demonstrate cognitive skills that review, analyse, consolidate and synthesize knowledge.
  3. Demonstrate an understanding of, and the ability to apply, the principles of teamwork and collaboration.
  4. Demonstrate communication skills to present a clear and coherent exposition of knowledge and ideas to a variety of audiences.
  5. Demonstrate the ability to effectively communicate scientific research in both written and oral forms, to both a specialist and a lay audience.
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## **COURSE EVALUATION AND DEVELOPMENT**

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Each year feedback is sought from students about the course and continual improvements are made based on this feedback.

**Outcomes of end of term course review:**

The course was reviewed at the end of the 2019 and prior to the start of Term 2 2020, the following changes were made, considering student (myExperience) feedback.

1. Course schedule was adjusted to accommodate remote delivery.
  2. Essay topics were refreshed.
  3. Additional elective workshop was added ('Neuroanatomy and brain atlas construction') to maintain class sizes of 10 or less.
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**ASSESSMENT PROCEDURES**

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Essay on Neuroscience related topic	40%
Student Journal Presentation	25%
Online quizzes	10%
3 Minute Thesis Presentation	25%

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

**Essay on Neuroscience related topic**

Students will write a 2000 ( $\pm 10\%$ ) word essay chosen from a list of topics related to contemporary issues in neuroscience research. Students will be required to summarise and critically evaluate the primary literature and provide references to justify their stance. Students will also evaluate essays written by their peers to engage them in the critical assessment of analytical writing and expose them to additional essay topics. Students will receive written feedback from the course convenors on their essay (35%) and peer review (5%).

**Student Journal Presentation**

Students will present, in small groups, a journal article to the class using PowerPoint or equivalent. The presentation will include an explanation of the motivation for the study, a description of the experimental approach, and a critical analysis of the results and the authors conclusions. Students will receive written feedback from the workshop facilitator, the course convenors, and peers. Assessment will be marked by the course convenors.

**Online quizzes**

Workshops will be followed by an online quiz. Quiz questions will be based on the material covered in the workshop and will enable students to assess their level of understanding of the material presented in the workshop. Quizzes are available via Moodle and typically consist of multiple choice or short answer questions. Students will receive immediate feedback after submitting their answers.

**3 Minute Thesis Presentation**

An essential skill for a modern scientist is the ability to communicate research projects and findings to a broad audience. This is particularly important in an academic setting as the research conducted at universities and research institutes is primarily funded through public money. To develop the communication skills of post-graduate research students The University of Queensland created a Three Minute Thesis (3MT®) competition. The competition has been adopted by universities throughout the world.

Students will prepare a 3-minute presentation of their thesis research “*to date*” in accordance with the Three Minute Thesis rules.

Students will receive formative feedback from the audience, and the course convenors. Assessment will be marked, and written feedback will be provided by the course convenors.

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**GENERAL INFORMATION**

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The School of Medical Sciences (SoMS) is located in the Wallace Wurth building, 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>.

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**Postgraduate research degrees**

The School of Medical Sciences offers students the opportunity to enter a Masters (MSc) or Doctorate (PhD) program in Medicine or Science and is available on the 'Students' menu item of the SoMS website.

**Attendance Requirements**

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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 on the School of Medical Sciences Website under Special Consideration.

Attendance at each workshop is compulsory. Arrival more than 15 minutes after the start of the class will be recorded as non-attendance. It is your responsibility to ensure that the demonstrator records your attendance and no discussions will be entered into after the completion of the class. 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 class per course may result in an additional practical assessment exam or in ineligibility to pass the course.

**Special Consideration**

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Please see [UNSW-Special Consideration](#) and [Student Advice-Special Consideration](#)

**Academic Integrity and Plagiarism**

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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](#).

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## WORKSHOP SCHEDULE

### Mandatory Workshops

#### Introduction, statistics, & thesis writing [Power, Kumar and Vickery]

Basic concepts and common misconceptions about statistical inference will be reviewed. Scientific writing will be discussed, and students will receive tips on how to prepare their honours thesis.

#### Careers and Communication

This workshop focuses on career opportunities (academic and non-academic) and communicating scientific results to the general public. What are some career options? How does one apply for a job or PhD studies?

### Elective Workshops

#### Recording Neuronal Activity [John Power, Gila Moalem-Taylor, Andrew Moorhouse, Kate Poole]

Workshop will introduce various methods of recording neuronal activity along with the uses and limitations of each technique. Students will learn how to analyse data.

#### Primer on transgenic technology [Natasha Kumar, Georg Von Jonquieres, Jeremy Pinyon]

Workshop will give an overview how transgenic organisms are engineered and how they enable researchers to study genetic diseases. Virtual workshop module: In silico PCR experimentation, endonuclease digest task, experience with bioinformatics tools such as NCBI BLAST, determination of DNA sequences containing either deletions or insertions based on DNA gel electrophoresis data that would directly affect neuronal function.

#### Neural Coding [Richard Vickery, Ingvars Birzniek, Jason Potas]

Neural coding is extensively studied in the intact nervous system and requires dedicated software to process and analyse data. For this, researchers require basic coding skills to custom build code specific for their data processing and analysis needs. This workshop will take real extracellular single-unit electrophysiological recordings and demonstrate how to perform some basic data cleaning, processing, analysis, and interpretation of neural signals. Students will use Julia, a new programming language, to view and process electrophysiological data.

#### Neuroanatomy and brain atlas construction [Steve Kassem, George Paxinos]

For scientists to test hypotheses inspired by human considerations on experimental animals we must identify homologies that exist between them. This workshop will give an overview of the neuroanatomy of the human and animal (rat, mouse, monkey, etc.) and how atlases of the brain are made and used. We will discuss the histology needed, introduce newer methods such as MRI and tractography, as well as, the historical and philosophical grounds on which this works are produced.

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## ASSESSMENT TASKS

<b>Task</b>	<b>Due Date</b>
Essay	Fri 26 June
Student Journal Presentation	During assigned workshop
Online quizzes	1 week after each workshop
3 Minute Thesis Presentation	Mon 17 August

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