

NEUR4421

Biomedical Perspectives in Neuroscience

Course Outline
Term 2, 2022

School of Medical Sciences
Faculty of Medicine & Health

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1. Staff

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Workshop Facilitator	Prof Kim Delbaere	k.delbaere@neura.edu.au	Margarete Ainsworth Building, NeuRA	NeuRA Phone: 9399 1066
Workshop Facilitator	Dr Steve Kassem	m.kassem@unsw.edu.au	NeuRA	NeuRA Phone: 9399 1128
Workshop Facilitator	A/Prof Richard Vickery	richard.vickery@unsw.edu.au	Rm 303, Level 3NW, Wallace Wurth building	SoMS - Physiology Phone: 9065 5283
Workshop Facilitator	Dr Martin Heroux	m.heroux@neura.edu.au	NeuRA	NeuRA Phone: 9399 1842
Workshop Facilitator	A/Prof Gila Moalem-Taylor	gila@unsw.edu.au	Rm 355B, Level 3SW, Wallace Wurth building	SoMS - Physiology Phone: 9385 2478
Workshop Facilitator	Dr Teri Furlong	t.furlong@unsw.edu.au	Rm 202, Level 2, Wallace Wurth building	SoMS - Anatomy Phone: 9348 0150
Workshop Facilitator	Prof Cyndi Shannon Weickert	c.weickert@neura.edu.au	NeuRA	UNSW Psychiatry & NeuRA Phone: 9399 1717
Workshop Facilitator	Dr Adam Walker	a.walker@neura.edu.au	NeuRA	UNSW Psychiatry & NeuRA Phone: 9399 1026

2. Course information

Units of credit: 6 UOC

Pre-requisite(s): Enrolled in Neuroscience Honours Plan

Teaching times and locations: Two mandatory half-day workshops that focus on professional skills (communication, career development, statistical inference), weeks 1 and 9. Two research-themed

workshops (7-8 contact hours per workshop), which includes lectures, journal article presentations, and hands-on activities related to specific biomedical research topic (weeks 3, 4, 7, 8, or 10).

<http://timetable.unsw.edu.au/2022/NEUR4421.html>

2.1 Course summary

This course offers workshops on specific current 'hot topic' issues in biomedical neurobiology, where you will be exposed to the latest research. Hands-on activities will give you real insight into modern neuroscience techniques, their correct implementation and their limitations. It is designed specifically for Neuroscience Honours students.

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 thought in modern neuroscience.

The seminars by discipline experts will cover the scope and range of approaches in neuroscience and provides the student with a broad base of knowledge from which to appreciate neuroscientific developments.

The group journal club 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 laboratory/tutorial exercises will give students a hands-on appreciation of applications of neuroscience and will enable them to learn while doing.

The three-minute thesis (3MT®) will encourage students to develop their neuroscience communication skills by learning to present a compelling oration on their thesis topic and its significance.

2.2 Course aims

- 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.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able 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 aural forms, to both a specialist and a lay audience.

2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Related Tasks & Assessment
CLO 1	Demonstrate a broad understanding of a body of knowledge and theoretical concepts.	Student Journal Presentation Online quizzes
CLO 2	Demonstrate cognitive skills that review, analyse, consolidate and synthesize knowledge.	Student Journal Presentation
CLO 3	Demonstrate an understanding of, and the ability to apply, the principles of teamwork and collaboration.	Student Journal Presentation
CLO 4	Demonstrate communication skills to present a clear and coherent exposition of knowledge and ideas to a variety of audiences.	Student Journal Presentation 3 Minute Thesis Presentation
CLO 5	Demonstrate the ability to effectively communicate scientific research in both written and aural forms, to both a specialist and a lay audience.	3 Minute Thesis Presentation

3. Strategies and approaches to learning

3.1 Learning and teaching activities

The workshops include seminars, tutorials, group presentations and hands-on experiments focusing on one or more neuroscientific technique. The workshops are scheduled to run face-to-face but can move online if necessary.

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 50 hours throughout the term and students are expected (and strongly recommended) to do at least the same number of hours of additional study.

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 on the School of Medical sciences Website under Special Consideration.

Attendance at laboratory and tutorial classes is compulsory and must be recorded in the class roll on the

day of the class. Arrival more than 15 minutes after the start of the class will be recorded as non-attendance. 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.

The students are required to attend the two mandatory workshops and two elective workshops. Parts of the workshops require the students to prepare beforehand.

4. Course schedule and structure

Week [Date]	Workshop Title	Activity [Learning opportunity]
Week 1 Mon 30 th May, 1pm-5pm	Introduction, statistics & thesis writing [mandatory]	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.
Week 2	No workshop	
Week 3 Wed 15 th June & Thurs 16 th June, 1.30pm-5pm.	The basics of Immunohistochemistry in mammalian brain [elective]	In this workshop you will be learning the basic principles of immunohistochemistry and learn how to stain neurons and astrocytes in coronal fresh frozen brain tissue.
Week 4 Wed 22 nd June & Thurs 23 rd June, 10am-4pm (with breaks for lunch and tea)	Neuroanatomy and brain atlas construction [elective]	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.
Week 5	No workshop	
Week 7 Wed 13 th July & Thurs 14 th July, 1pm-5pm	Recording/imaging neuronal and glial activity [elective]	This workshop will explain electrophysiological and optical methods of recording neuronal activity, glial cell imaging, and the uses and limitations of each technique.
Week 8 Tues 19 th July & Wed 20 th July, 1pm-5pm	Primer on transgenic technology [elective]	This workshop focuses on how transgenic organisms are engineered and how they enable researchers to study genetic diseases.
Week 9 Wed 27 th July, 12-5pm	Careers and Communication [mandatory]	This workshop focuses on career opportunities (academic and non-academic) and communicating scientific results to the general public.

Week 10 Tues 2 nd August & Thurs 4 th August, 10am-1pm	The neuropsychology of healthy ageing and falls in older adults [elective]	In this workshop you will learn more about the role of the brain in age-related changes leading to postural stability or specific undiagnosed or chronic disease.
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WORKSHOP DETAILS

Introduction, statistics, & thesis writing [John Power, Martin Heroux, Richard Vickery]

Week 1: Monday 30th May, 1pm-5pm

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 [Jennie Cederholm, Teri Furlong]

Week 9: Wednesday 27th July, 12pm-5pm

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

The basics of Immunohistochemistry in mammalian brain [Cyndi Shannon Weickert, Adam Walker]

Week 3: Wednesday 15th June (1.30pm-5pm) and Thursday 16th June (1.30pm-5pm)

During these two afternoons, you will be learning the steps to stain both neurons and astrocytes in coronal fresh frozen brain tissue. You will be rapidly fixing, blocking, incubating, washing and visualizing the colorimetric reaction occurring after a successful detection procedure. You will also Nissl stain, coverslip and examine your preparation under the light microscope. You will be prepping and staining slides from mouse, rat, monkey or human sections with different brain regions available to choose from as well. You will be asked to describe the size and morphology of the visualized cells and compare the stain to the no-primary control slide. You will be learning the difference between a primary antibody and secondary antibody and the reasoning behind each blocking step.

We will also be discussing the basic principles of immunohistochemistry via a short introduction on the first afternoon and comparing and contrasting various ways to validate your primary antibody (preabsorption, immunoprecipitation, western blotting, cloning and in vitro expression, knock-out mice).

At the end of this workshop, you will emerge with improved skill in reading about and evaluating the rigor of immunohistochemical procedures used on scientific research papers.

Neuroanatomy and brain atlas construction [Steve Kassem]

Week 4: Wednesday 22nd June (10am-4pm; with breaks for lunch and tea) and Thursday 23rd June (10am-4pm; with breaks for lunch and tea)

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 these works are produced.

Recording/Imaging neuronal and glial activity [John Power, Gila Moalem-Taylor]

Week 7: Wednesday 13th July (1pm-5pm) and Thursday 14th July (1pm-5pm)

Investigating the transfer of information and its processing in the nervous system is key to understanding brain function in health and neurological conditions and diseases. This can be achieved by recording and modulating neuronal activity and the associated glial response. This workshop will explain electrophysiological and optical methods of recording neuronal activity, as well as live imaging of glial cells. The uses and limitations of these techniques will be discussed. Some of these techniques will be demonstrated in the lab, and students may have the opportunity to make their own neuronal recordings.

Primer on transgenic technology [Georg von Jonquieres]

Week 8: Tuesday 19th July (1pm-5pm) and Wednesday 20th July (1pm-5pm)

Workshop will overview how transgenic organisms are engineered and how they enable researchers to study genetic diseases. We will investigate transgene constructs, a diversity of mouse genetics (crelox, transactional, CRISPRCas9), and viral vectors. Hands on workshop includes plasmid endonuclease digest, determination of DNA sequences containing either deletions or insertions based on DNA gel electrophoresis data that would directly affect neuronal function. You will learn to use bioinformatics tools allowing you to investigate sequence alignment, cross species conservation, putative transcription binding sites, siRNA design for a gene of interest.

The neuropsychology of healthy ageing and falls in older adults [Kim Delbaere]

Week 10: Tuesday 2nd August (10am-1pm) and Thursday 4th August (10am-1pm)

Falls pose a major threat to the well-being and quality of life of older people. Falls can result in fractures and other injuries, disability and fear and can trigger a decline in physical function and loss of independence and autonomy. While falls are not a diagnostic category, they are often indicative of underlying problems due to age-related changes in the physiological domains contributing to postural stability or specific undiagnosed or chronic disease.

Exam Period: 12 August – 25 August

Supplementary Exam Period: 5 September – 9 September

5. Assessment

5.1 Assessment tasks

Assessment task	Length	Weight	Due date and time
Assessment 1: Student Journal Presentation	30 min	30%	During assigned elective workshop.
Assessment 2: Online quizzes	40 min	40%	1 week after each workshop.
Assessment 3: 3 Minute Thesis Presentation	3 min	30%	July 29 th 12pm-4.30pm

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

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 convenor, and peers. Assessment will be marked by the workshop hosts and/or course conveners. Students will be graded on their presentation (25%) and on their peer review of another student's presentation (5%).

Online quizzes

Workshops will be followed by quizzes using the Inspira platform. The quizzes are open book and available to complete one week after the workshops from 8am until 8pm. You will have 40 minutes to complete each quiz once you commence the test. 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 the online learning management system (Moodle) and typically consist of multiple choice or short answer questions. Students will receive 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. Assessment will be marked, and written feedback will be provided by the course convenors.

5.3 Submission of assessment tasks

Late Submission

Students must attempt all assignments. Late submissions will be penalized at 10% per day for the first 5 calendar days (weekends included). Submissions received after 5 days will receive zero marks but may be given feedback.

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

Student Journal Presentation: Students will receive written feedback from the workshop facilitator, the course convenor, and peers.

Quizzes: Students will receive feedback upon submitting their answers.

3 Minute Thesis Presentation: Students will receive formative feedback from the audience and the course convenors, as well as written feedback from the course convenors.

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.

Please use APA referencing style for this course.

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.*¹ At UNSW, this means that your work must be your own, and others' ideas 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

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

- The ELISE training site <http://subjectguides.library.unsw.edu.au/elise/presenting>

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

3 Minute Thesis Presentation Rules

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.

You will prepare a 3-minute presentation of your thesis *to date (thesis proposal for midterm entrants)* in accordance with the Three Minute Thesis rules listed below. The presentation should be informative and communicate the 5 Ws: Who, What, When, Where, Why. Your presentation will be assessed according to the judging criteria given below.

Rules

- A single static PowerPoint slide is permitted (no slide transitions, animations or 'movement' of any description, the slide is to be presented from the beginning of the oration).
- No additional electronic media (e.g. sound and video files) are permitted.
- No additional props (e.g. costumes, musical instruments, laboratory equipment) are permitted.
- Presentations are limited to 3 minutes maximum
- Presentations are to be spoken word (e.g. no poems, raps or songs).
- Presentations are considered to have commenced when a presenter starts their presentation through movement or speech.
- The decision of the adjudicating panel is final.

7.1 Judging Criteria

Comprehension and content: 50%

1. Did the presentation provide an understanding of the background to the research question being addressed and its significance?
2. Did the presentation clearly describe the key results of the research including conclusions and outcomes?
3. Did the presentation follow a clear and logical sequence? Was the thesis topic, key results and research significance and outcomes communicated in language appropriate to a non-specialist audience?
4. Did the speaker avoid scientific jargon, explain terminology and provide adequate background information to illustrate points?
5. Did the presenter spend adequate time on each element of their presentation – i.e. didn't elaborate for too long on one aspect, or rush?

Engagement and communication: did the oration make the audience want to know more? 50%

1. Was the presenter careful not to trivialise or generalise their research?
2. Did the presenter convey enthusiasm for their research?
3. Did the presenter capture and maintain their audience's attention?
4. Did the speaker have sufficient stage presence, eye contact and vocal range; maintain a steady pace, and have a confident stance?
5. Did the PowerPoint slide enhance the presentation - was it clear, legible, and concise?

For additional information and videos of the best talks can be found here:

<http://research.unsw.edu.au/three-minute-thesis-competition>

<http://threeminutethesis.org>

<https://research.unsw.edu.au/3-minute-thesis-3mt-development-series-webinar-workshops>

8. Administrative matters

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

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>.

The School of Medical Sciences offers students the opportunity to enter a Masters (MSc) or Doctorate (PhD) program in Physiology, Pharmacology, Anatomy or Pathology which is available on the 'Students' menu item of the [SoMS website](#).

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>