



MEDI7004

Decoding the Brain

Session 1, Weekday attendance, North Ryde 2020

Medicine, Health and Human Sciences Faculty level units

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General Information

Unit convenor and teaching staff Simon McMullan simon.mcmullan@mq.edu.au
Credit points 10
Prerequisites Admission to MRes and ((MEDI204 or MEDI2300) or (BIOL257 or BIOL2230) or (PSY354 or PSYU3354))
Corequisites
Co-badged status
Unit description This unit will introduce students to contemporary approaches to the investigation of brain structure and function. You will focus on applying rapidly developing technologies to unravel the complex organisation of the brain circuits that underlie movement, sensation and homeostatic function. You will be introduced to strategies and tools, including the genetic, optical, electronic and analytical tools neuroscientists use to probe the workings of the brain. You will also be introduced to the obstacles that will need to be overcome if future scientists are to explain the most complex structure in the known universe.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Explain the functional organization of the nervous system as it pertains to the transmission of information between neurons, the conduction of electrical activity ultimately the encoding of information within the various functional systems of the nervous system, and describe the key experimental observations through which those insights were gained.

ULO2: Demonstrate proficient knowledge of current research techniques used in neuroscience and design experiments that use them to answer questions relating to structure and function of the brain or the development of novel experimental or analytical

techniques.

ULO3: Critically evaluate the neuroscience literature and identify current gaps in knowledge or misconceptions relating to a topic of their choice.

ULO4: Analyze and interpret real experimental data.

ULO5: Demonstrate proficient skills in research communication and self-directed learning by reviewing and appraising the contemporary neuroscience literature and conveying their findings to their peers.

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult [iLearn](#) for revised unit information.

[Find out more about the Coronavirus \(COVID-19\) and potential impacts on staff and students](#)

General Assessment Information

Assessments

Grade descriptors and other information concerning grading are contained in Schedule 1 of the Macquarie University Assessment Policy, which is available at: <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/assessment>.

Further details for each assessment task will be available on iLearn.

All final grades in the Masters of Research are determined by a grading committee and are not the sole responsibility of the Unit Convenor.

Students will be awarded a final grade plus a Standardised Numerical Grade (SNG). The SNG is not necessarily a summation of the individual assessment components. The final grade and SNG that are awarded reflect the corresponding grade descriptor in the Grading Policy.

To pass this unit, students must demonstrate sufficient evidence of achievement of the learning outcomes, attempt all assessment tasks, meet any ungraded requirements including professionalism and achieve an SNG of 50 or better.

Student Professionalism

In the Faculty of Medicine and Health Sciences, professionalism is a key capability embedded in all our courses. As part of developing professionalism, students are expected to attend all small group interactive sessions including tutorials, as well as clinical- and laboratory-based practical sessions.

Furthermore, lectures and seminars are key learning activities that you are expected to attend

throughout completion of the Masters of Research. While audio recordings and lecture slides may be made available following these large group sessions, it is important to recognise that such resources are a study aid and should not be considered an alternative to lecture or seminar attendance.

Students are required to attend a minimum of 80% of all small group interactive sessions. Students that do not meet this requirement may be deemed unable to meet expectations regarding professionalism and may be referred for disciplinary action (which may include exclusion from assessments and unit failure).

Similarly, as part of developing professionalism, students are expected to submit all work by the due date. Applications for assessment task extensions must be supported by appropriate evidence and submitted via www.ask.mq.edu.au. For further details please refer to the Special Consideration Policy available at <https://students.mq.edu.au/study/my-study-program/special-consideration>.

Late Submission

All assignments that are officially received after the due date, and where no extension or special consideration has been granted, will incur a deduction of 5% per day, including weekends and public holidays and the actual day received. This will continue up until 10 days after due date, after which the assignment if submitted will be awarded a mark of zero. For example:

Due date	Received	Days late	Deduction	Raw mark	Final mark
Friday 14th	Monday 17th	3	15%	75%	60%

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

Classes

The weekly format of MEDI7004 will be:

2x 1-hour lectures: Mondays at 12 pm, 17WW-238 and Fridays at 12 pm, 25aWW-113

1x 1-hour tutorial: Tuesdays at 10 am, 11WW-180 (this will usually be a student-led journal club)

1x 1-hour workshop: Tuesday at 11 am, 11WW-180

Practical classes - human cadaver warning

One of the teaching activities in this unit is a human brain anatomy workshop, in which students will have an opportunity to examine and touch human post-mortem brain samples. Students are required to wear closed shoes and a lab coat/gown to attend practical classes. Some students may find examination of human post-mortem tissue confronting; students are encouraged to discuss their concerns with the unit convenor in advance.

Recommended reading

Augustinack, J. C., van der Kouwe, A. J., Salat, D. H., Benner, T., Stevens, A. A., Annese, J., . . . Corkin, S. (2014). H.M.'s contributions to neuroscience: a review and autopsy studies. *Hippocampus*, 24(11), 1267-1286. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6007845/pdf/nihms970614.pdf>

Cajal, R. y. (1906). [Nobel Lecture - The structure and connexions of neurons]. http://www.nobelprize.org/nobel_prizes/medicine/laureates/1906/cajal-lecture.html

Damasio, H., Grabowski, T., Frank, R., Galaburda, A. M., & Damasio, A. R. (1994). The return of Phineas Gage: clues about the brain from the skull of a famous patient. *Science*, 264(5162), 1102-1105. <https://science.sciencemag.org/content/264/5162/1102.long>

David, S., & Aguayo, A. J. (1981). Axonal elongation into peripheral nervous system "bridges" after central nervous system injury in adult rats. *Science*, 214(4523), 931-933. <https://science.sciencemag.org/content/214/4523/931.long>

Di Ieva, A. (2011). *Brain Anatomy in Clinical and Neurosurgical Perspective*. <https://researchers.mq.edu.au/en/publications/brain-anatomy-from-a-clinical-and-neurosurgical-perspective-a-cli>

Feinstein, J. S., Adolphs, R., Damasio, A., & Tranel, D. (2011). The human amygdala and the induction and experience of fear. *Curr Biol*, 21(1), 34-38. doi:10.1016/j.cub.2010.11.042 <https://www.ncbi.nlm.nih.gov/pubmed/21167712>

Fenno, L. E., Mattis, J., Ramakrishnan, C., Hyun, M., Lee, S. Y., He, M., . . . Deisseroth, K. (2014). Targeting cells with single vectors using multiple-feature Boolean logic. *Nat Methods*, 11(7), 763-772. doi:10.1038/nmeth.2996 <http://www.nature.com/nmeth/journal/v11/n7/pdf/nmeth.2996.pdf>

Glickstein, M. (2006). Golgi and Cajal: The neuron doctrine and the 100th anniversary of the 1906 Nobel Prize. *Curr Biol*, 16(5), R147-151. doi:10.1016/j.cub.2006.02.053 <https://www.ncbi.nlm.nih.gov/pubmed/16527727>

Guillery, R. W. (2005). Observations of synaptic structures: origins of the neuron doctrine and its current status. *Philos Trans R Soc Lond B Biol Sci*, 360(1458), 1281-1307. doi:10.1098/rstb.2003.1459 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1569502/pdf/rstb20031459.pdf>

Hubel, D. H. (1957). Tungsten Microelectrode for Recording from Single Units. *Science*, 125(3247), 549-550. doi:10.1126/science.125.3247.549 <https://science.sciencemag.org/content/125/3247/549.long>

Hubel, D. H. (1982). Exploration of the primary visual cortex, 1955-78. *Nature*, 299(5883), 515-524. doi:10.1038/299515a0 <https://www.nature.com/articles/299515a0.pdf>

Hubel, D. H., & Wiesel, T. N. (1962). Receptive fields, binocular interaction and functional architecture in the cat's visual cortex. *The Journal of Physiology*, 160(1), 106-154. doi:10.1113/jphysiol.1962.sp006837 <https://physoc.onlinelibrary.wiley.com/doi/pdf/10.1113/jphysiol.1962.sp006837>

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Jonas, E., & Kording, K. P. (2017). Could a Neuroscientist Understand a Microprocessor? *PLoS Comput Biol*, 13(1), e1005268. doi:10.1371/journal.pcbi.1005268 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5230747/pdf/pcb.1005268.pdf>

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Rieke, F., Warland, D., de Ruyter van Steveninck, R., & Bialek, W. (1997). Chapter 1: Introduction. In T. J. Sejnowski & T. A. Poggio (Eds.), *Spikes: Exploring the Neural Code*. Cambridge, MA, USA: MIT Press.

Roth, B. L. (2016). DREADDs for Neuroscientists. *Neuron*, 89(4), 683-694. doi:10.1016/j.neuron.2016.01.040 <https://doi.org/10.1016/j.neuron.2016.01.040>

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Sharma, P., Srivastava, P., Seth, A., Tripathi, P. N., Banerjee, A. G., & Shrivastava, S. K. (2019). Comprehensive review of mechanisms of pathogenesis involved in Alzheimer's disease and potential therapeutic strategies. *Prog Neurobiol*, 174, 53-89. doi:10.1016/j.pneurobio.2018.12.006 <https://www.ncbi.nlm.nih.gov/pubmed/30599179>

Stern, J. E., Son, S., Biancardi, V. C., Zheng, H., Sharma, N., & Patel, K. P. (2016). Astrocytes Contribute to Angiotensin II Stimulation of Hypothalamic Neuronal Activity and Sympathetic Outflow. *Hypertension*, 68(6), 1483-1493. doi:10.1161/HYPERTENSIONAHA.116.07747 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5159229/pdf/nihms-816417.pdf>

Tansey, E. M. (2006). Henry Dale and the discovery of acetylcholine. *C R Biol*, 329(5-6), 419-425. doi:10.1016/j.crvi.2006.03.012

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Technology Used

Active participation in learning activities throughout the unit will generally require students to have access to a tablet, laptop or similar device. Students who do not own their own laptop computer may borrow one from the university library.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and

Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.