



# COGS2030

## Hearing and Brain

Session 2, In person-scheduled-weekday, North Ryde 2023

*School of Psychological Sciences*

### Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	6
<u>Policies and Procedures</u>	8
<u>Changes since First Published</u>	10

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## General Information

Unit convenor and teaching staff

Co-convenor

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Co-convenor

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Judy Zhu

[judy.zhu@mq.edu.au](mailto:judy.zhu@mq.edu.au)

Credit points

10

Prerequisites

COGS1000 or COGS100 or PSYU1101 or PSYU1104 or PSYC104 or PSYU1102 or PSYU1105 or PSYC105

Corequisites

Co-badged status

Unit description

Hearing is of fundamental importance for human cognition and communication and reflects the complex interplay of physical, biological, and psychological processes. This unit will provide a detailed introduction to the cognitive neuroscience of hearing. Topics will include the neuroanatomy and physiology of the auditory system; how the brain is organised to achieve identification and localisation of sound sources; how the auditory system interacts with motor, speech and language systems in the brain; the science of cochlear implants; the nature and cognitive consequences of hearing loss; and the science and technology of cochlear implants. Lecture topics will be reinforced and complemented with hands-on tutorials covering the fundamentals of digital signal processing and analysis of acoustic and speech signals.

## 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 structure and function of the auditory system, with an emphasis on how the brain is organized to structure sound information into meaningful perceptual and cognitive units.

**ULO2:** Demonstrate an understanding of the causes of hearing impairments and hearing loss, the effects of hearing loss on cognitive functioning, and the current capabilities and limitations of artificial sensory prosthetic devices.

**ULO3:** Critically evaluate contemporary theories and concepts of audition, including the interface of the auditory system with the motor and speech systems of the brain and with other aspects of human cognition.

**ULO4:** Display effective scientific communication in written form.

**ULO5:** Display a practical understanding of digital signal processing (DSP) techniques by applying them flexibly and appropriately to measure and analyse acoustic and speech signals.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Final exam</u>	40%	No	Session 2 Exam period
<u>Software code portfolio</u>	15%	No	29/10/23
<u>Commentary paper</u>	15%	No	08/10/23
<u>Online quizzes</u>	10%	No	Weekly
<u>Mid-term exam</u>	20%	No	06/09/23

### Final exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 34 hours

Due: **Session 2 Exam period**

Weighting: **40%**

Multiple-choice and short-answer exam

On successful completion you will be able to:

- Explain the structure and function of the auditory system, with an emphasis on how the brain is organized to structure sound information into meaningful perceptual and cognitive units.
- Demonstrate an understanding of the causes of hearing impairments and hearing loss,

the effects of hearing loss on cognitive functioning, and the current capabilities and limitations of artificial sensory prosthetic devices.

- Critically evaluate contemporary theories and concepts of audition, including the interface of the auditory system with the motor and speech systems of the brain and with other aspects of human cognition.
- Display effective scientific communication in written form.
- Display a practical understanding of digital signal processing (DSP) techniques by applying them flexibly and appropriately to measure and analyse acoustic and speech signals.

## Software code portfolio

Assessment Type <sup>1</sup>: Portfolio

Indicative Time on Task <sup>2</sup>: 12.5 hours

Due: **29/10/23**

Weighting: **15%**

Compilation and explanation of code used in weekly tutorials.

On successful completion you will be able to:

- Display a practical understanding of digital signal processing (DSP) techniques by applying them flexibly and appropriately to measure and analyse acoustic and speech signals.

## Commentary paper

Assessment Type <sup>1</sup>: Report

Indicative Time on Task <sup>2</sup>: 12.5 hours

Due: **08/10/23**

Weighting: **15%**

Highly structured critical analysis of hearing research across the disciplines (max. 750 words)

On successful completion you will be able to:

- Critically evaluate contemporary theories and concepts of audition, including the interface of the auditory system with the motor and speech systems of the brain and with other aspects of human cognition.
- Display effective scientific communication in written form.

## Online quizzes

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 9 hours

Due: **Weekly**

Weighting: **10%**

Weekly online MC quizzes completed before each class lecture.

On successful completion you will be able to:

- Explain the structure and function of the auditory system, with an emphasis on how the brain is organized to structure sound information into meaningful perceptual and cognitive units.
- Demonstrate an understanding of the causes of hearing impairments and hearing loss, the effects of hearing loss on cognitive functioning, and the current capabilities and limitations of artificial sensory prosthetic devices.

## Mid-term exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 17 hours

Due: **06/09/23**

Weighting: **20%**

Multiple-choice exam

On successful completion you will be able to:

- Explain the structure and function of the auditory system, with an emphasis on how the brain is organized to structure sound information into meaningful perceptual and cognitive units.
- Demonstrate an understanding of the causes of hearing impairments and hearing loss, the effects of hearing loss on cognitive functioning, and the current capabilities and limitations of artificial sensory prosthetic devices.
- Critically evaluate contemporary theories and concepts of audition, including the interface of the auditory system with the motor and speech systems of the brain and with other aspects of human cognition.
- Display a practical understanding of digital signal processing (DSP) techniques by applying them flexibly and appropriately to measure and analyse acoustic and speech signals.

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment

- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

### Essential Information for this Course

#### Getting Started

Lectures will introduce students to the neuroanatomy and physiology of the auditory system; development and plasticity; how the brain is organised to identify and localise sound sources; and how the auditory system interacts with the brain's motor, speech, and language systems.

Tutorials will be practical, hands-on activities in which students will learn the fundamentals of digital signal acquisition and methods for processing and analysing sounds and speech signals. These digital signal processing (DSP) skills will complement and reinforce the lecture material; and serve as a base for future development of DSP skills in other cognitive science and linguistics applications, including electrophysiological signal analysis and neuroimaging.

#### Lectures

- Convener: Paul Sowman/ Judy Zhu

Teaching Staff: Paul Sowman, Harvey Dillon, Brent Edwards, Amanda Barnier, David McAlpine, Mridula Sharma, Iain Giblin, Michael Proctor

Tutors: TBA

Time: Weds 9 -10:30

Lectures: 14 Sir Christopher Ondaatje Ave – T3 Theatre

Practicals and Tutorials:

- Lecture slides will be uploaded just before the lecture date under the lecture link in the relevant week below. Lecture recordings will be available through Echo360, accessible through the link on the right.

#### Tutorials

- Tutorials are held weekly, starting in Week 1 of Session 1. Please check eStudent for the time and location of your tutorial. Changes to tutorials need to be made online via eStudent only (neither the unit convenor nor the tutor can make changes to your tutorial enrolment). After week 2, no further changes will be allowed unless supporting documentation about the reason for changing is provided and there is space in the tutorial you wish to enrol in.

#### Textbook/Readings

- Recommended text: Schnupp J, Nelkin I, King A (2012). Auditory Neuroscience: Making Sense of Sound. MIT Press: Cambridge MA.
- Companion website with demos: <https://auditoryneuroscience.com/>

### Weekly online quizzes

This unit has weekly online quizzes designed to keep you on track during the fast-paced semester (10 quizzes in total). Quizzes will be graded as full or no credit, and no partial credit will be given. To receive full credit on a quiz, you must correctly answer at least 50% of the multiple-choice questions. You will only receive credit for that quiz if you correctly answer at least 50% of the questions. No make-up quizzes will be permitted (except officially approved [Disruption to Studies](#) requests). However, your two lowest quizzes will be dropped at the end of the semester.

As indicated above, quizzes must be completed online each week before the tutorials and lectures. Only quizzes completed during this time window will be recorded. These quizzes are open-book.

#### To access the online quizzes:

1. Navigate to the appropriate week in iLearn (e.g., Week 2) and click on that week's quiz (e.g., Week 2: Quiz).
2. Read the information provided about what Chapters or page numbers that quiz will cover (it's open book!), and note the date and time the quiz will close.
3. Click "Attempt quiz now" to begin. After answering each multiple-choice question, click "Save and review".
4. Next, ensure you have answered each question (i.e., "Answer saved"). If you have not answered a question (i.e., "Not yet answered"), click "Return to attempt".
5. Once satisfied that you have answered every question, click "Submit all and finish". This will submit your quiz for scoring and log your grade.
6. Finally, you can carefully review your answers to note which questions you did and did not answer correctly. The correct answer for each question will be given.
7. Click "Finish review" to exit. You can attempt the quiz again by selecting "Re-attempt quiz", **but only your first attempt will count towards your grade.**

### Questions about the unit

- If you have questions about the unit, the first place to check for answers is in the information provided in the unit guide and on this iLearn page. If you cannot find your answer, we strongly encourage you to consult the General Discussion Forum on iLearn. The discussion forum can be a great resource for administrative and content-related questions. Plus, posting to the discussion forum means other students can join and benefit from the discussion.

- If you still cannot find the answer you seek, your tutor can answer most of the questions that you may have about the unit, including questions about the unit in general and specific questions about the tutorials. If you have trouble in this unit, you should approach your tutor first. You can contact your tutor before or after your tutorial via email or the dialogue tool on iLearn. Tutor contact details can be found at the top of this unit guide. Please note that your tutor is your first contact for any of these questions. The unit convenor can be contacted via email.

### **Late penalty**

- Late submissions will receive a 5% per day penalty including weekends and public holidays. If you submit the assessment task 10 days or more beyond the due date, you will be awarded a maximum of 50% of the overall assessment marks without an approved extension.

### **Requests for extensions, medical leave and/or disruption to studies:**

- Please note that it is the student's responsibility to notify the University of a disruption to their studies. All requests for extensions, medical leave and/or disruption to studies should be made before the due date for the assignment, and are to be made directly via the University's online [Ask MQ](#) system (as outlined in the [Disruption to Studies Policy](#)).

### **Uploading assignments via iLearn**

- You are required to submit your Lab Reports via iLearn, using the Turnitin submission tool. Please use the following step-to-step [guide](#) on how to submit a Turnitin assignment.

## **Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central](#) (<https://policies.mq.edu.au>). 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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)



- [Special Consideration Policy](#)

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

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

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

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the 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

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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.

## Changes since First Published

Date	Description
23/07/2023	Staff contacts changed.

Unit information based on version 2023.01R of the [Handbook](#)