COGS2030

Hearing and Brain

Session 2, Special circumstance, North Ryde 2020

Department of Cognitive Science

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Convener
Blake Johnson
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By appointment

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Tutor
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Credit points
10

Prerequisites
COGS1000 or COGS100 or PSYU1104 or PSYC104 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.

General Assessment Information

Late submission of an assignment will attract a penalty of 5% of the maximum mark for every day that the assignment is late (including weekend days). For example, if the assignment is worth 15 marks and your assignment is submitted 2 days late, a penalty of 2x5%x15 = 1.5 marks will be applied and subtracted from the awarded mark for the assignment. Work submitted more than 7 days after the submission deadline will not be marked and will receive a mark of 0. Please note that it is the student's responsibility to notify the University of a disruption to their studies and requests for extensions for assignments must be made via the University's Ask MQ System (as outlined in the Special Consideration Policy).

For written assignments, there will be 10% leeway in the word limit (e.g., up to 75 words over 750), but beyond that you will be penalised 5% of your report mark for every further 75 words over the limit.

Assessment Tasks

Name	Weighting	Hurdle	Due
Online quizzes	10%	No	Weekly

Name	Weighting	Hurdle	Due
Final exam	40%	No	Session 2 Examination Table
Mid-term exam	20%	No	8 September
Commentary paper	15%	No	11/10/20
Software code portfolio	15%	No	1/11/20

Online quizzes

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 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.

Final exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 34 hours
Due: **Session 2 Examination Table**
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.

Mid-term exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 17 hours
Due: **8 September**
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.

Commentary paper

Assessment Type [1]: Report
Indicative Time on Task [2]: 12.5 hours
Due: **11/10/20**
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.

Software code portfolio

Assessment Type [1]: Portfolio
Indicative Time on Task [2]: 12.5 hours
Due: **1/11/20**
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.

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[1] 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.

[2] 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

Delivery of Learning Activities

Lectures: All lectures will be delivered online, starting in Week 1. The officially scheduled lecture time is **Tues 9:00 - 10:30 AM**. Depending on the lecturer, lectures will either be pre-recorded and uploaded through Echo360 prior to the officially scheduled lecture time or the lecture will be live-streamed via Zoom/Echo360 during the officially scheduled time. All lectures, regardless of initial delivery mode, will be recorded and made available for asynchronous viewing through Echo360.

Tutorials: To maximise flexibility for COGS2030 students, tutorials will be delivered in both on-campus and online delivery modes. Tutorials are scheduled for Weeks 2, 3, 6, 7, 10, 11, and 13. All on-campus tutorials will take place in the **Faculty PC Lab (12SW 421)**. Due to social distancing requirements, you will have to attend the on-campus tutorial you enrolled in through eStudent. You will not be able to attend another on-campus tutorial class instead. If you have enrolled in an online tutorial, consult iLearn for further details.

Practicals: The practicals are an essential part of COGS2030 and cannot be delivered online. All students are therefore require to participate in these practicals on-campus. The practicals are scheduled for Weeks 1, 5, and 8. Due to social distancing requirements, you must attend the practical you enrolled in through eStudent. You will not be able to attend another practical class instead. In case you are unable to attend a practical class in person due to unavoidable reasons (immunocompromised, illness, etc.), you should apply for Special Consideration through AskMQ. If you have questions about applying for special consideration, please contact the Faculty Student Centre. Reasonable adjustments will be made for students with approved special consideration.

Unit Schedule

Week	Date	Lecture	Text	Tutorial/Practical
1	28 July	Overview / Sound (Johnson)	Ch 1	**Practical** Lab(1) Introduction to MATLAB Lab(2) Basic plotting in MATLAB **3 hrs**
2	4 Aug	Sound / The ear (Johnson)	Ch 1,2	Lab(3) Signal types and generation **1.5 hrs**
3	11 Aug	The central auditory system (Johnson)	Ch 3	Lab(4) Signal transformation **1.5 hrs**
4	18 Aug	Auditory scene analysis (Johnson)	Ch 6	
5	25 Aug	Hearing loss (Harvey Dillon)	Ch 8	**Practical** Lab(5) Sampling and aliasing Lab(6) Audio in MATLAB **3 hrs**
6	1 Sept	Hearing loss and cognition (Brent Edwards)	Ch 8, Readings	Mid-term review **1.5 hours**
7	8 Sept	**Mid-term Exam**		**MATLAB review** **1.5 hrs**
Recess	14-20 Sept			

Recess	21-27 Sept			
8	29 Sept	Binaural hearing (Jaime Underraga)	Ch 5	**Practical** Lab(7) Frequency domain analysis Lab(8) Filtering in MATLAB **3 hrs**
9	6 Oct	Speech perception (Johnson)	Ch 4	
10	13 Oct	Clinical audiology and speech in noise (Mridula Sharma)	Ch 8, assigned readings	Lab(9) Sound-based examples **1.5 hrs**
11	20 Oct	Music perception (Iain Giblin)	Ch 6, Assigned readings	Lab(10) Fundamental frequency estimation and variation **1.5 hrs**
12	27 Oct	Speech production (Mike Proctor)	Ch 4, Readings	
13	3 Nov	Wrap-up (Johnson)		**Final Review** **1.5 hrs**

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). 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). 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 (https://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.