SPH 399

The Acoustics of Speech

S2 Day 2019

Dept of Linguistics

Contents

General Information

Unit convenor and teaching staff

Convenor
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Credit points
3

Prerequisites
39cp at 100 level or above including 6cp in LING units at 200 level including (LING210 or LING217)

Corequisites

Co-badged status

Unit description
The aim of this unit is to foster a detailed understanding of speech acoustics. This unit is based around lecture and practical laboratory workshops. Essential topics in speech acoustics are addressed commencing with acoustic theory, focusing particularly on the phenomenon of resonance. This is followed by an examination of the acoustic theory of speech production, which describes the interaction between vocal sound sources and the resonant or filtering effects of different vocal articulations. The unit examines in detail the acoustics of vowels and consonants, voice quality, prosody (intonation and stress) and coarticulation.

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:

Demonstrate an understanding of acoustic analysis of sound

Explain how speech can be represented acoustically

Demonstrate understanding of the acoustic theory of speech production

Use standard computer software to analyse the acoustic features of consonants and vowels

Examine and report on the acoustic characteristics of individuals' speech production

Examine the acoustics of coarticulated speech and demonstrate the ability to deconstruct coarticulated acoustic representations

Demonstrate an understanding of the acoustic correlates of prosody

Ilustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

General Assessment Information

It is a requirement of this unit that you make a serious attempt to complete all assessment tasks. Failure to make a serious attempt to complete all assessment tasks may result in failure in the whole unit even if the marks on the completed tasks total more than 50% because assessment tasks demonstrate attainment of the learning outcomes.

Submission

Unless you are explicitly informed otherwise for a specific assignment, all assignments must be submitted via Turnitin.

Extension Requests and Lateness Policy

Late submissions without an extension will receive a penalty of 3% of the total mark available for the assessment task per day including weekend days (i.e. this is 3% of the total marks possible for the task – NOT 3% of the marks the student received. For example, if the assessment task is worth 100 marks and the student is two days late their mark for the task is reduced by 6 marks). Late submission of an assessment task without an extension will not be accepted at all after the date on which marked assessment tasks have been released to the rest of the class. Any student with unsubmitted work at this date will receive a mark of 0 for the assessment task.

Extensions will only be given in special circumstances, and can be requested by completing the Special Consideration request at ask.mq.edu.au and providing the requisite supporting documentation. Extensions that will result in submissions after the assessment task has been

returned to the class will require a separate assessment task to be completed at the unit convenor's discretion.

For more information on Special Consideration, see the university website https://students.mq.edu.au/study/my-study-program/special-consideration

If a student fails the unit due to non-submission of an assignment or non-attendance at an exam, an FA grade will be applied in accordance with the University's Assessment Policy. Unit convenors have the discretion to determine whether or not students should fail a unit on the basis of lateness penalties alone if other learning outcomes of the unit have been met.

Academic Honesty

As a good student, you are responsible for ensuring academic integrity practices are followed at all times. Your first step is to read the University's Academic Honesty Policy, and make sure you know what constitutes good practice. Then make sure you know how to reference and cite correctly. There are other practices we need to consider, and one of these is the potential for collusion.

Informal study groups are encouraged as a good way to assist your learning, but please remember that all your independently assessed assignments must be totally independently completed. Unless you are doing a group project where each member contributes to producing one piece of work, for which you get the one mark, using part or all of another person's work constitutes collusion and breaches the University's Academic Honesty policy.

What is collusion?

This is the unauthorised presentation of group work as your own. It may involve

- Working with someone to provide one piece of work
- Allowing others to share your assignment answer or copy your work
- Using the assignment answer or work of another student (past or present) with or without their permission. It is collusion even if only small parts of the assignment are used
- Allowing others to edit and write your work
- Editing or writing the work of another student
- Offering to do work for another student or seeking payment for preparing academic work for someone else

How can you avoid collusion?

- Do not share your findings or answers to an assignment
- Do not use another student’s case studies, findings or ideas about an assignment
- Do not ask another student for a copy of their assignment
- Do not share your current or past assignments with another student (whether to “look at the structure” or any other reason).
- Do not post solutions to assessment problems on any social media or online platforms

It is recommended that you complete this Academic Integrity Module:

Academic honesty is considered to be extremely important by the Department of Linguistics and the University. All assignments are submitted to Turnitin and compared with other assignments (past and present) and with content on the internet. Serious breaches of academic honesty may result in failure of the unit or in extreme cases suspension or expulsion from the university.

Assessment Tasks

Name	Weighting	Hurdle	Due
Online Quiz	10%	No	Week 3
Vowel Assignment	25%	No	Week 8
Consonant Assignment	25%	No	Week 11
Exam	40%	No	Exam Period

Online Quiz

Due: **Week 3**
Weighting: **10%**

Quiz on material presented in weeks 1 and 2.

On successful completion you will be able to:

- Demonstrate an understanding of acoustic analysis of sound

Vowel Assignment

Due: **Week 8**
Weighting: **25%**

The Vowel assignment is based on the spectrogram reading skills acquired in the workshops. It requires students to acoustically analyse their own vowels and present a report comparing their vowel spaces to others from the literature.

On successful completion you will be able to:

- Demonstrate an understanding of acoustic analysis of sound
- Explain how speech can be represented acoustically
- Demonstrate understanding of the acoustic theory of speech production
- Use standard computer software to analyse the acoustic features of consonants and vowels

- Examine and report on the acoustic characteristics of individuals' speech production

Consonant Assignment

Due: **Week 11**
Weighting: **25%**

The Consonant Assignment is based on the spectrogram reading skills acquired in the workshops and lectures and requires analysis and interpretation of acoustic data.

On successful completion you will be able to:

- Demonstrate an understanding of acoustic analysis of sound
- Explain how speech can be represented acoustically
- Use standard computer software to analyse the acoustic features of consonants and vowels
- Examine and report on the acoustic characteristics of individuals' speech production
- Examine the acoustics of coarticulated speech and demonstrate the ability to deconstruct coarticulated acoustic representations

Exam

Due: **Exam Period**
Weighting: **40%**

The final exam requires 4 short-answer responses from a pool of 6 questions to be completed in 90 minutes.

On successful completion you will be able to:

- Demonstrate an understanding of acoustic analysis of sound
- Demonstrate understanding of the acoustic theory of speech production
- Examine the acoustics of coarticulated speech and demonstrate the ability to deconstruct coarticulated acoustic representations
- Demonstrate an understanding of the acoustic correlates of prosody
- Ilustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

Delivery and Resources

Materials:

The learning and teaching strategies used in this Unit are structured around an extensive set of interactive text, image and audio based online materials as well as lecture presentations (recorded lectures and associated resources), readings and workshop participation. The unit iLearn site contains details of the timetable of topics with links to the relevant materials.

Interaction with ilearn discussion facility is expected. Students must use ilearn to access important messages.

Attendance:

Attendance at practical workshop sessions is a necessary component of the unit. Practical workshop sessions are designed to help you develop the necessary skills and understanding required to meet the learning outcomes of the unit. The two major assignments and the exam require the ability to interpret acoustic data which you will learn in the pracs.

Text:

- Johnson, K. (2012) *Acoustic and Auditory Phonetics*, 3rd Edition Wiley-Blackwell: Cambridge

Reading List:

- Clark, J., Yallop, C. & Fletcher, J. (2007) *An introduction to phonetics and phonology*, (3rd Edition), Oxford: Blackwell (especially Chapter 7, "The Acoustics of Speech Production")
- Cox, F. (2012) *Australian English: Pronunciation and Transcription*, Cambridge UP: Melbourne.
- Fant, G. (1960) *Acoustic Theory of Speech Production*, Mouton, s'Gravenhage.
- Fant, G. (1973) *Speech Sounds and Features*, MIT Press, Cambridge.
- Fant, G. (2004) *Speech Acoustics and Phonetics: Selected Writings*, Kluwer Academic, Boston, Mass.
- Fry, D.B. (1979) *The Physics of Speech*, Cambridge UP: Cambridge, (QP306.F8/1979)
- Gick, B., Wilson, I. & Derrick, D. (2013) *Articulatory Phonetics*, Wiley-Blackwell, Chichester.
- Hardcastle, W., Laver, J. & Gibbon, F. (2010) (Eds.) *The Handbook of Phonetic Sciences*, John Wiley, Chichester.
- Harrington, J. (2010) *Phonetic Analysis of Speech Corpora*, Wiley-Blackwell, Chichester.
- Harrington J. & Cassidy S. (1999) *Techniques in Speech Acoustics*, Kluwer: Dordrecht, especially chapters 1-4. (P221.5.H37/1999)
- Kent, R. D. (1993). Vocal tract acoustics. Journal of Voice, 7(2), 97–117
- Kent R. D. & Read, C. (2002) *Acoustic Analysis of Speech*. Singular: Albany
- Kent, R. D., Kim, Y. (2009). Acoustic Analysis of Speech. In The Handbook of Clinical Linguistics (pp. 360–380). John Wiley and Sons.
- Ladefoged, P. (1962) *Elements of Acoustic Phonetics*, U. Chicago Press: Chicago (QP306.L33)
- Ladefoged, P. & Johnson, K. (2015) *A Course in Phonetics*, 7th Edition, Cengage

Learning, Stamford.

- Ladefoged, P. & Maddieson, I. (1996). *The sounds of the world's languages*. Oxford, UK; Cambridge, Mass.: Blackwell.
- Ladefoged, P. (2005). *Vowels and consonants: an introduction to the sounds of languages*. Malden, MA: Blackwell
- Stevens, K. N. (1998) *Acoustic Phonetics*, MIT Press: Cambridge (P221.5 .S74)
- Zsiga, E. C. (2012). *The Sounds of Language : An Introduction to Phonetics and Phonology*. Chicester: John Wiley & Sons

Unit Schedule

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.)*

Undergraduate 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 improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

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.

Graduate Capabilities

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of acoustic analysis of sound
- Explain how speech can be represented acoustically
- Demonstrate understanding of the acoustic theory of speech production
- Use standard computer software to analyse the acoustic features of consonants and vowels
- Examine and report on the acoustic characteristics of individuals' speech production
- Examine the acoustics of coarticulated speech and demonstrate the ability to deconstruct coarticulated acoustic representations
- Demonstrate an understanding of the acoustic correlates of prosody
- Ilustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

Assessment tasks

- Online Quiz
- Vowel Assignment
- Consonant Assignment
- Exam

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Explain how speech can be represented acoustically
- Examine and report on the acoustic characteristics of individuals' speech production
- Ilustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

Assessment tasks

- Vowel Assignment
- Consonant Assignment

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Explain how speech can be represented acoustically
- Use standard computer software to analyse the acoustic features of consonants and vowels
- Examine the acoustics of coarticulated speech and demonstrate the ability to deconstruct coarticulated acoustic representations

Assessment tasks

- Online Quiz
- Vowel Assignment

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Use standard computer software to analyse the acoustic features of consonants and vowels
- Examine and report on the acoustic characteristics of individuals' speech production

Assessment task

- Vowel Assignment