



# SPH 399

## The Acoustics of Speech

S2 Day 2016

*Dept of Linguistics*

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#### **Disclaimer**

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## General Information

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Credit points

3

Prerequisites

39cp including 6cp in LING units at 200 level including (LING210(P) or LING217(P))

Corequisites

Co-badged status

### Unit description

This unit is based around lecture and practical laboratory workshops. Essential topics in speech acoustics are addressed commencing with general 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

Be able to 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 their own and others' 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

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

## General Assessment Information

### Assessment

Assessment Task	Weight	Due Date
Class Test (covering weeks 1-2)	10%	TBA
Vowel Assignment	25%	4th October 2016

Consonant Assignment	25%	28th October 2016
Final Exam	40%	Final exam period

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%.

### Submission

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

### Extension Requests and Lateness Policy

Any request for an extension must be provided with associated documentation via ask@mq before the assignment deadline.

Unless you have negotiated an extension based on documented evidence of significant disruption to your studies, a penalty of 5% of the total marks for the assignment per day (including 2 days for weekends) will apply to late submissions.

Unless otherwise negotiated, assignments will not be accepted at all AFTER the date on which the marked assignments are returned to students in the unit.

### 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).

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	Due
<a href="#">Consonant Assignment</a>	25%	Week 11
<a href="#">Vowel Assignment</a>	25%	Week 8
<a href="#">Exam</a>	40%	Exam Period
<a href="#">Class Test</a>	10%	Week 3

### Consonant Assignment

Due: **Week 11**

Weighting: **25%**

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

On successful completion you will be able to:

- Demonstrate an understanding of acoustic analysis of sound

- Be able to 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 their own and others' speech production
- Examine the acoustics of coarticulated speech and demonstrate the ability to deconstruct coarticulated acoustic representations

## 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
- Be able to 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 their own and others' speech production

## Exam

Due: **Exam Period**

Weighting: **40%**

The final exam requires 4 short essays 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
- Illustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

## Class Test

Due: **Week 3**

Weighting: **10%**

In class test on material presented in weeks 1 and 2.

On successful completion you will be able to:

- Demonstrate an understanding of acoustic analysis of sound

## Delivery and Resources

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.

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)
- Harrington J. & Cassidy S. (1999) *Techniques in Speech Acoustics*, Kluwer: Dordrecht, especially chapters 1-4. (P221.5.H37/1999)
- 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.
- Kent R. D. & Read, C. (2002) *Acoustic Analysis of Speech*. Singular: Albany
- 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.
- Stevens, K. N. (1998) *Acoustic Phonetics*, MIT Press: Cambridge (P221.5 .S74)

## Unit Schedule

**Lecture Timetable:** (FC = Felicity Cox, TB = Titia Benders, AS = Anita Szakay)

Week	Date	Lecture	Lecturer	Prac
1	1st August	Acoustic Analysis of Speech: Waveforms	TB	
2	8 August	Acoustic Analysis of Speech: Spectra and Spectrograms	TB	Recording
3	15 August	Acoustic Theory of Speech Production	TB	Recording
4	22 August	Acoustic Analysis by Computer	TB	Recording
5	29 August	Vowels	FC	Praat
6	5 September	Vowels	FC	Vowels
7	12 September	Consonants	FC	Vowels
Mid Semester Break				
8	3 October	No Lecture	FC	Consonants
9	10 October	Consonants	FC	Consonants
10	17 October	Consonants	FC	Consonants
11	24 October	Acoustics of Coarticulation	AS	



12	31 October	Acoustics of Prosody	AS	
13	7 November	Speech perception	TB	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, 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](http://ask.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](http://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](http://ask.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/](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
- Be able to 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 their own and others' 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
- Illustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

## **Assessment tasks**

- Consonant Assignment
- Vowel Assignment
- Exam
- Class Test

## **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**

- Be able to explain how speech can be represented acoustically
- Examine and report on the acoustic characteristics of their own and others' speech production
- Illustrate the relationship between the acoustic characteristics of various speech sounds and speech perception

## **Assessment tasks**

- Consonant Assignment
- Vowel 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

- Be able to 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

- Vowel Assignment
- Class Test

## 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 their own and others' speech production

## Assessment task

- Vowel Assignment

## Changes since First Published

Date	Description
26/07/2016	The textbook has been updated to: Johnson, K. (2012) Acoustic and Auditory Phonetics, 3rd Edition, Wiley-Blackwell, Cambridge.