



SPHL2216

Speech Acoustics

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

Department of Linguistics

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General Information

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Credit points

10

Prerequisites

LING217 or LING2217

Corequisites

Co-badged status

Unit description

Human speech makes use of the special acoustic properties of the vocal tract to generate the sounds of each language and to communicate them with an unlimited range of expression. In this unit, we explore the acoustic properties of speech which make this possible, and acoustic theories of speech production which describe its linguistic use. Topics include: general acoustics, source-filter theory, acoustics of vowels and consonants, acoustic description of Australian English and sounds in other languages, voice quality, speech variation, coarticulation, and prosody. Practical exercises include analysis of your own vowel space.

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 how speech can be represented acoustically.

ULO2: Illustrate concepts pertinent to the acoustic theory of speech production.

ULO3: Analyse the acoustic features of consonants and vowels using standard methodologies.

ULO4: Differentiate the acoustic characteristics of segmental and voice quality aspects of speech.

ULO5: Describe the acoustic characteristics of different speech source types and voice qualities.

ULO6: Demonstrate the ability to deconstruct coarticulated acoustic representations.

ULO7: Analyse and describe the acoustic correlates of prosody.

ULO8: Engage in a research-rich environment.

General Assessment Information

Grade descriptors and other information concerning grading are contained in the [Macquarie University Assessment Policy](#).

All final grades are determined by a grading committee, in accordance with the Macquarie University Assessment Policy, and are not the sole responsibility of the Unit Convenor.

Students will be awarded a final grade and a mark which must correspond to the grade descriptors specified in the [Assessment Procedure](#) (clause 128).

To pass this unit, you must demonstrate sufficient evidence of achievement of the learning outcomes, meet any ungraded requirements, and achieve a final mark of 50 or better.

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

Late Submissions

Unless a Special Consideration request has been submitted and approved, a 5% penalty (OF THE TOTAL POSSIBLE MARK) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11.55pm. A 1-hour grace period is provided to students who experience a technical concern.

For example:

Number of days (hours) late	Total Possible Marks	Deduction	Raw mark	Final mark
1 day (1-24 hours)	100	5	75	70

2 days (24-48 hours)	100	10	75	65
3 days (48-72 hours)	100	15	75	60
7 days (144-168 hours)	100	35	75	40
>7 days (>168 hours)	100	-	75	0

Late submission of time sensitive tasks, such as timetabled tests/exams, scheduled performance assessments/presentations, scheduled practical assessments/labs, will be addressed by the unit convenor in a Special consideration application.

Special Consideration

If you are unable to complete an assessment task on or by the specified date due circumstances that are unexpected, unavoidable, significantly disruptive and beyond your control, you may apply for special consideration in accordance with the [special consideration policy](#). Applications for special consideration must be supported by appropriate evidence and submitted via ask.mq.edu.au

Use of Generative AI

Please refer to instructions from your lecturer on the use and acknowledgement of use of Generative AI in your submitted assignments.

Assessment Tasks

Name	Weighting	Hurdle	Due
Vowel Analysis	30%	No	Week 7
Consonant Analysis	30%	No	Week 11
Final Exam	35%	No	Exam Period
Research Participation	5%	No	Week 13

Vowel Analysis

Assessment Type ¹: Report

Indicative Time on Task ²: 30 hours

Due: **Week 7**

Weighting: **30%**

The aim of this assignment is to examine the acoustic phonetic properties of the vowels of a single speaker. Using the tools and techniques for spectrographic analysis developed in workshops, students will plot their own vowel space, and present a report describing the phonetic properties of their vowels in comparison with published vowel data. Indicative report length: 1500 words.

On successful completion you will be able to:

- Explain how speech can be represented acoustically.
- Illustrate concepts pertinent to the acoustic theory of speech production.
- Analyse the acoustic features of consonants and vowels using standard methodologies.
- Differentiate the acoustic characteristics of segmental and voice quality aspects of speech.
- Demonstrate the ability to deconstruct coarticulated acoustic representations.
- Engage in a research-rich environment.

Consonant Analysis

Assessment Type ¹: Report

Indicative Time on Task ²: 30 hours

Due: **Week 11**

Weighting: **30%**

The aim of this assignment is to examine the acoustic phonetic properties of English consonants in connected speech. Using the tools and techniques for spectrographic analysis developed in workshops, students will segment and quantify the consonants in speech recordings, and analyze and describe the allophonic and coarticulatory processes involved. Indicative report length: 1500 words.

On successful completion you will be able to:

- Explain how speech can be represented acoustically.
- Illustrate concepts pertinent to the acoustic theory of speech production.
- Analyse the acoustic features of consonants and vowels using standard methodologies.
- Differentiate the acoustic characteristics of segmental and voice quality aspects of speech.
- Describe the acoustic characteristics of different speech source types and voice qualities.

- Demonstrate the ability to deconstruct coarticulated acoustic representations.
- Analyse and describe the acoustic correlates of prosody.

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 1.5 hours

Due: **Exam Period**

Weighting: **35%**

Knowledge and understanding of the topics covered in the unit will be assessed in a 90 minute examination, requiring written responses to a range of questions and problems.

On successful completion you will be able to:

- Explain how speech can be represented acoustically.
- Illustrate concepts pertinent to the acoustic theory of speech production.
- Analyse the acoustic features of consonants and vowels using standard methodologies.
- Differentiate the acoustic characteristics of segmental and voice quality aspects of speech.
- Describe the acoustic characteristics of different speech source types and voice qualities.
- Demonstrate the ability to deconstruct coarticulated acoustic representations.
- Analyse and describe the acoustic correlates of prosody.

Research Participation

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 1 hours

Due: **Week 13**

Weighting: **5%**

Students will participate in a study to learn more about current research directions in speech and language, and to gain first-hand experience in the research process. Research participation typically involves one hour of your time. You will be able to choose from a short list of studies being conducted by researchers in Linguistics, Psychology, and Cognitive Science. If you do not wish to participate in any of the available studies, you will be given the option of completing an alternative assessment task to satisfy this component of the unit.

On successful completion you will be able to:

- Engage in a research-rich environment.
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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

This unit is designed to foster a detailed understanding of speech acoustics, its relevance to phonetics and phonology, and methods used to study the acoustic properties of speech. These concepts will be studied through an extensive set of readings and multimedia resources, and will be consolidated in companion lectures, workshops and assessment tasks. The unit provides students with essential theoretical and practical skills that are fundamental to further study of speech and which assist clinicians in understanding and working with speech and auditory data.

Topics to be covered include: general acoustic theory; sound waves; spectrograms; resonance; turbulence; source-filter theory; formants; acoustic properties of vowels; acoustic properties of consonants; coarticulation; prosody; and digital representation and processing of speech.

Students are required to engage seriously with all learning materials following the schedule provided on iLearn. Announcements and discussion forums should be consulted regularly, and teaching materials must be reviewed in a timely manner to ensure that all participants are up-to-date with communications and aware of unit requirements. Active participation in the learning activities throughout the unit will require students to have access to computer. Students who do not own their own computer may use computing resources provided by the university library.

In workshops and assessment tasks, you will be presented with different types of speech data, and record your own speech for analysis, to consolidate your understanding of acoustic phonetics. These materials are designed to help you explore how speakers of different languages manipulate the acoustic properties of speech to generate phonological contrast, to signal linguistic information, and to communicate information about who we are.

Preparation for and attendance at all classes is expected. Classes are designed to consolidate concepts introduced in readings, through explanation and presentation of examples, engagement with different types of data, questions, discussion, and seminar-type exercises. Learning the concepts necessary to gain a solid understanding of speech acoustics and speech analysis techniques requires dedication, practice, and engagement. We are here to support your learning and we can only do this successfully through structured contact to guide you through the materials and techniques. It is your responsibility to actively engage in the learning process with your teachers and peers.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](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 or if you are a Global MBA student contact 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/.

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.

Inclusion and Diversity

Social inclusion at Macquarie University is about giving everyone who has the potential to benefit from higher education the opportunity to study at university, participate in campus life and flourish in their chosen field. The University has made significant moves to promote an equitable,

diverse and exciting campus community for the benefit of staff and students. It is your responsibility to contribute towards the development of an inclusive culture and practice in the areas of learning and teaching, research, and service orientation and delivery. As a member of the Macquarie University community, you must not discriminate against or harass others based on their sex, gender, race, marital status, carers' responsibilities, disability, sexual orientation, age, political conviction or religious belief. All staff and students are expected to display appropriate behaviour that is conducive to a healthy learning environment for everyone.

Professionalism

In the Faculty of Medicine, Health and Human 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 clinical, practical, laboratory, work-integrated learning (e.g., PACE placements), and team-based learning activities. Some learning activities are recorded (e.g., face-to-face lectures), however you are encouraged to avoid relying upon such material as they do not recreate the whole learning experience and technical issues can and do occur. As an adult learner, we respect your decision to choose how you engage with your learning, but we would remind you that the learning opportunities we create for you have been done so to enable your success, and that by not engaging you may impact your ability to successfully complete this unit. We equally expect that you show respect for the academic staff who have worked hard to develop meaningful activities and prioritise your learning by communicating with them in advance if you are unable to attend a small group interactive session.

Another dimension of professionalism is having respect for your peers. It is the right of every student to learn in an environment that is free of disruption and distraction. Please arrive to all learning activities on time, and if you are unavoidably detained, please join activity as quietly as possible to minimise disruption. Phones and other electronic devices that produce noise and other distractions must be turned off prior to entering class. Where your own device (e.g., laptop) is being used for class-related activities, you are asked to close down all other applications to avoid distraction to you and others. Please treat your fellow students with the utmost respect. If you are uncomfortable participating in any specific activity, please let the relevant academic know.