

Spring 2018 – Physics of Speech (SPLH/LING 120)

Professor.	Dr. Navin Viswanathan
Office.	Dole 3029
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Class meeting times.	Tue & Thu:
Place.	Dole 2094
Office hours.	Tue: 2:20 pm to 3:00 pm and Thu: 12:00 pm to 12:30 pm.

Notes: (1) Please also read the document on **Course Policies**.

(2) Please refer to your **lab syllabus** for Grad TA information and meeting times.

Course pre-requisites, co-requisites and other restrictions

MATH 101 or 104 or equivalent. PHSX 111 is recommended for students with no background of basic physics.

Course Description

This course offers an introduction to the acoustic structure of speech intended for non-science majors. Emphasis will be placed on the methods and standards by which scientists measure and evaluate the physical characteristics of speech. Topics will include: simple harmonic motion, the propagation of sound waves, aerodynamic aspects of vocal fold vibration, resonance, digital speech processing, frequency analysis, and speech synthesis. Three class hours and one laboratory per week.

Learning Objectives and Outcomes

- To be able to describe the generation and propagation of simple and complex sound waves
- To be able to perform basic analysis of simple and complex sound waves
- To describe and demonstrate acoustic and articulatory characteristics of consonant and vowels
- To apply basic principles of psychophysics to describe basic speech perception

Required Textbooks and Materials

Mullin, W.J., Gerace, W.J., Mestre, J.P., and Velleman, S.L. (2003). Fundamentals of sound with applications to speech and hearing. Boston: Allyn & Bacon.

Any other required material will be shared on Blackboard.

Grading Policy

Grading Scale and Interpretation of Performance Level per University Senate Rules and Regulations

A ~ Outstanding; B ~ High; C ~ Satisfactory; D ~ Minimal; F ~ Inadequate

A: 94 +	A- : 90 ~ 93	B+: 87 ~ 89	B: 84 ~ 86
B-: 80 ~ 84	C+: 77 ~ 79	C: 74 ~ 76	C- : 70 ~ 74
D+: 67 ~ 69	D: 64 ~ 66	D- : 60 ~ 64	F: < 60

Assignments (See attached schedule and lab syllabus for all due dates)

10 lab reports	30%
2 in-class quizzes	30%
1 midterm exam	20%
1 comprehensive final exam	20%

In-class quizzes

A total of 2 quizzes will be administered in class. Students are expected to work independently on quizzes. You will be allowed to bring your calculator as well as one sheet of formulas for each quiz. In calculating final grades, each of the 2 quizzes is worth 15% of your grade.

Midterm and Final Exams

Midterm and final exams: The exams will include (1) multiple-choice (2) short-answer numerical and (3) true-or-false questions to assess your knowledge of the course content and ability to apply concepts and formulas learned in class. Questions will include material covered in the readings and in class lectures and discussions. For each of these exams, you will be allowed to bring your calculator as well as one sheet of formulas. Each exam is worth 20% of your grade.

Course Schedule

Note.

- (1) The dates of quizzes and exams are fixed.
- (2) Schedule of topics may change depending on the pace of learning.
- (3) Please check Blackboard for the most current schedule or use this or [use this self-updating link](#)

Week	Tue	Topic	Thu	Topic	Fri	Lab that week
1	Jan 16	Syllabus- Introduction	Jan 18	Background Math, SI Units, Basic Physics etc	Jan 19	<i>INTRO LAB</i>
2	Jan 23	Background Math, SI Units, Basic Physics - II	Jan 25	Intro to Waves	Jan 26	Lab 1: Generating & Measuring Sine Waves
3	Jan 30	Waves - II	Feb 1	Waves - III	Feb 2	Lab 2: Pitch and Frequency
4	Feb 6	Waves - IV	Feb 8	Review	Feb 9	NO LAB
5	Feb 13	Quiz 1	Feb 15	Standing Waves I	Feb 16	Lab 3: Loudness and Intensity
6	Feb 20	Standing Waves II	Feb 22	Intensity, Loudness, Sound Pressure - I	Feb 23	Lab 4: Complex Waves
7	Feb 27	Intensity, Loudness, Sound Pressure - II	Mar 1	Intensity, Loudness, Sound Pressure - III	March 2	Lab 5: Speech Perception
8	Mar 6	Loudness and Hearing Loss	Mar 8	Hearing Loss/Loudness Problems/ Review	March 9	Lab 6: Filters
9	Mar 13	Midterm Exam	Mar 15	Acoustic analyses of Complex Signals - Speech	March 16	Lab 7: Noise and Hearing Loss
10	Mar 20	Springbreak	Mar 22	Springbreak	March 23	spring break

11	Mar 27	Complex Waves/ Basic Signal Processing - I	Mar 29	Complex Waves/ Basic Signal Processing - II	March 30	Lab 8: Vowel Space
12	Apr 3	Speech Production: Consonants	Apr 5	Speech Production: Vowels and other sounds	April 6	Lab 9: Co-articulation and Word Segments
13	Apr 10	Speech Production: Phonation/Air Flow {Online Class} No Class Meeting	Apr 12	Quiz 2	April 13	Lab 10: Final Lab
14	Apr 17	Speech Perception - I	Apr 19	Speech Perception -II	<i>April 20</i>	NO LAB
15	Apr 24	Speech Intelligibility	Apr 26	Room Acoustics	<i>April 27</i>	NO LAB
16	May 1	Flex Class	May 3	Tutorial -	<i>May 4</i>	NO LAB(Stop day)

All information provided in this syllabus is meant to serve as guidance and is subject to change. If any of this information changes, I promise to announce this change in class. It is your responsibility, however, to keep track of these changes (especially if you miss a class).

Have a great semester ahead!