GSEM 140g Proposal: The Speaking Minds
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Course description

How do humans produce and understand language? What happens in the brain when we talk, listen, and comprehend language? This course takes you on a journey through the fascinating world of speech and language, blending insights from linguistics, psychology, and neuroscience.

We'll explore the full journey of human speech and language: from the spark of an idea in your mind to the precise movements of your tongue, lips, and voice box that shape sounds. You'll learn how your ears and brain decode those sounds back into words and how higher-level encoding of meaning, and context is handled by our language system. The journey continues as we explore how language connects with memory, attention, and other cognitive abilities—and what happens when this system breaks down in speech and language disorders.

In this course, you'll learn by twisting your tongue, moving your lips, and hearing the sounds you make come alive, discovering the physical processes of speech. Through hands-on demonstration, exercises and assignments, you'll experiment with the complex and abstract architecture of language in fun way, discovering how words and sentences are planned, produced, and understood—experimenting with the complex and abstract architecture of language in fun way.

Students from all majors and backgrounds are welcome. No prior experience is needed, just curiosity about how the mind and body work together to create human communication. Whether you're drawn to linguistics, cognitive science, speech technology, or human health, this GE Seminar can offer something for you.

Syllabus

Week 1	**Introduction** Speech and language; Methods in cognitive neuroscience of language
Week 2	**Basics of linguistics I** Phonetics and phonology: Speech Anatomy; Articulatory phonetics; Tour to speech sounds of the world's languages; the IPA
Week 3	**Basics of linguistics II** Syntax, semantics and pragmatics;
Week 4	**Speech and language production I** Language production: from lexical concept to articulatory encoding
Week 5	**Speech and language production II** Acoustic phonetics: source-filter theory, waveforms, spectra and spectrograms; Acoustic analysis of speech sounds
Week 6	**Speech perception and comprehension I** Auditory processing; Lack of invariance in speech perception; Motor versus auditory theory; Categorical perception;
Week 7	**Speech perception and comprehension II**

	Spoken word recognition
Week 8	**Higher-level language processing I** Speech prosody: tone, intonation, and tempo; Neural bases of prosodic encoding
Week 9	**Higher-level language processing II** Neurocognitive processes in syntactic, semantic and pragmatic encoding;
Week 10	**Language and Memory**
Week 11	**Language Development**
Week 12	**Language and Brain lateralization**
Week 13	**Disorders of speech and language functions I** Speech disorders: Dysarthria; Apraxia of Speech; Stuttering
Week 14	**Disorders of speech and language functions II** Language disorders: Aphasia; Dyslexia
Week 15	**Final presentation**

GE-D Life Sciences Course Goals

The goal of this course is to introduce students to the scientific investigation of speech and language withing the cognitive science context. The whole course is centered on the speech chain—from meanings to articulation, from articulation to speech sounds, from auditory processing to meanings. The students will also discover how these processes intersect with other cognitive domains like memory and attention. They will also understand how the system can break down in speech and language disorders.

Students will learn by directly engaging with the processes in the speech chain. Group activities and exercises give students the opportunity to analyze speech sounds of the world's languages. They will learn to produce the sounds using their vocal organs and practice percieving these sounds. They will also develop skills to transcribe speech sounds and quantitatively analyze speech acoustics. Real mini experiments are also included to help students grasp abstract linguistic concepts and processes in language production and perception. In their assignments, students will read scientific articles, summarize key findings, critically evaluate the experiments, and present their analyses to the class. Through these activities, students will develop quantitative reasoning, analytical thinking, collaborative skills, and scientific literacy, gaining hands-on experience in evaluating and communicating research in language production and comprehensive or more broadly cognitive science.