

## Term Information

Effective Term Spring 2017

## General Information

Course Bulletin Listing/Subject Area Speech and Hearing Science  
Fiscal Unit/Academic Org Speech & Hearing - D0799  
College/Academic Group Arts and Sciences  
Level/Career Graduate  
Course Number/Catalog 7825  
Course Title Speech Perception in the Normal and Impaired Ear  
Transcript Abbreviation Speech Perception  
Course Description SHS 7825 is a graduate seminar-format course in speech & hearing science. We will discuss the auditory processing of speech sounds and examine the ramifications of hearing loss and cochlear implantation on this processing.  
Semester Credit Hours/Units Fixed: 3

## Offering Information

Length Of Course 14 Week  
Flexibly Scheduled Course Never  
Does any section of this course have a distance education component? No  
Grading Basis Letter Grade  
Repeatable No  
Course Components Lecture  
Grade Roster Component Lecture  
Credit Available by Exam No  
Admission Condition Course No  
Off Campus Never  
Campus of Offering Columbus

## Prerequisites and Exclusions

Prerequisites/Corequisites Grad standing in Speech and Hearing Science, or permission of instructor.  
Exclusions Not open to students with credit for 820.

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code 51.0202  
Subsidy Level Doctoral Course  
Intended Rank Masters, Doctoral

## Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

## Course Details

### Course goals or learning objectives/outcomes

- Increased knowledge of the processing of spectral and temporal aspects of speech sounds. Increased knowledge of the delivery of speech cues by cochlear implants.

### Content Topic List

- Introduction
  - Spectral Cues in Speech Recognition
  - Temporal Cues in Speech Recognition
  - Spectro-Temporal Cues in Speech Recognition
  - Cochlear Implants

## Attachments

- 7825Syllabus\_v2.doc: Syllabus  
*(Syllabus. Owner: Ellawadi, Allison Bean)*

## Comments

- See 9-28-16 e-mail to A Ellawadi. *(by Vankeerbergen, Bernadette Chantal on 09/28/2016 09:26 AM)*
- 1. I am changing this to a doctoral-level course.  
2. Reminder: ASC curriculum committees do not meet over the summer. The ASC review of this course will be during AU16 for the first time. *(by Haddad, Deborah Moore on 07/11/2016 07:31 PM)*

## Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Ellawadi, Allison Bean	07/11/2016 06:04 PM	Submitted for Approval
Approved	Fox, Robert Allen	07/11/2016 06:11 PM	Unit Approval
Approved	Haddad, Deborah Moore	07/11/2016 07:31 PM	College Approval
Revision Requested	Vankeerbergen, Bernadette Chantal	09/28/2016 09:26 AM	ASCCAO Approval
Submitted	Ellawadi, Allison Bean	10/29/2016 09:09 PM	Submitted for Approval
Approved	Fox, Robert Allen	10/29/2016 11:43 PM	Unit Approval
Approved	Haddad, Deborah Moore	10/30/2016 03:26 PM	College Approval
Pending Approval	Nolen, Dawn Vankeerbergen, Bernadette Chantal Hanlin, Deborah Kay Jenkins, Mary Ellen Bigler Hogle, Danielle Nicole	10/30/2016 03:26 PM	ASCCAO Approval

## Course Syllabus

# SHS 7825: Speech Perception in the Normal and Impaired Ear

Dr. Eric W. Healy

Fri 9:30 AM – 12:15 PM  
Pressey Hall Rm 024  
3 credits, 2.75 contact hours/week

Office: Pressey Hall Rm 134b  
office hours by appointment  
(614) 292-8973  
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### **Course Description**

SHS 7825 is a graduate seminar-format course in speech & hearing science. We will discuss the auditory processing of speech sounds and examine the ramifications of hearing loss and cochlear implantation on this processing.

**Readings:** Source literature as provided.

**Course Objectives:** Recent years have brought about changes to our understanding of speech perception, and the cues used by the auditory system to perform this task. Specifically, we now have a deeper understanding of where particularly useful information resides in frequency and how this information at different frequencies interacts. We also have a deeper understanding of the role of temporal cues in speech perception. And finally, the interaction of these cues – spectro-temporal cues – are now better appreciated. In this course, we will gain this current understanding of the cues used by the auditory system to understand speech. We will also gain an understanding of how the use of specific cues is hindered by sensorineural hearing impairment. Finally, we will gain an understanding of the cues delivered by the bionic hearing prosthetic, and how these are similar and different from those of normal hearing.

### **Evaluation**

**Exams:** There will be one mid-term and one final, each worth 30% of your grade. They will be take-home exams in essay format. Dates will be determined during the first week of classes, as attempts will be made to coordinate with and accommodate the demands of other coursework.

**Paper:** There will be a paper due at the end of the semester, during finals week. It will be a review of a particular aspect of auditory research and will account for 20% of your grade. The instructor is willing to work with you to choose an appropriate topic and to guide the selection of appropriate background material.  
(~8-10 pps, ~15 refs)

**Presentations:** In-class presentation of literature will constitute the remaining 20% of your grade. Although one student will lead the discussion. All are expected to participate in some way. Attendance is accordingly mandatory.

The OSU Standard Grade Scheme will be employed

- 93 - 100 (A)
- 90 - 92.9 (A-)
- 87 - 89.9 (B+)
- 83 - 86.9 (B)
- 80 - 82.9 (B-)
- 77 - 79.9 (C+)
- 73 - 76.9 (C)
- 70 - 72.9 (C-)
- 67 - 69.9 (D+)
- 60 - 66.9 (D)
- Below 60 (E)

<b>Calendar:</b>	<b>Topic</b>	<b>Readings</b>
Aug. 26	Overview of acoustics and filtering	
Sept. 2	Spectral Cues in Speech Recognition I	ANSI, 1997; Warren et al., 1995
Sept. 9	Spectral Cues in Speech Recognition II	Warren et al., 1999; Warren et al., 2004
Sept. 16	Spectral Cues in Speech Recognition III	Stickney & Assman, 2001; Healy et al., 2013
Sept. 23	Spectral Cues in Speech Recognition IV	ter Keurs et al., 1992; ter Keurs et al., 1993
Sept. 30	Temporal Cues in Speech Recognition I	Moore, 2007; Rosen, 1992
Oct. 7	Temporal Cues in Speech Recognition II	VanTassell, 1987; Turner et al., 1995
Oct. 14	<i>Fall Break – No Classes</i>	
Oct. 21	Spectro-Temporal Cues in Speech Recognition I	Shannon et al., 1995; Shannon et al., 1998
Oct. 28	Spectro-Temporal Cues in Speech Recognition II	Dorman et al., 1997, Friesen et al., 2001
Nov. 4	Spectro-Temporal Cues in Speech Recognition III	Dorman et al., 1998; Zeng et al., 2002
Nov. 11	<i>Veteran’s Day – No Classes</i>	
Nov. 18	Cochlear Implants I	Loizou, 2006
Nov. 25	<i>Thanksgiving – No Classes</i>	
Dec. 2	Cochlear Implants II	Fu et al., 2002; Kreft et al., 2004

## **Reading List**

- American National Standards Institute. (1997). *ANSI-S3.5. (1997), American national standard methods for the calculation of the speech intelligibility index*. New York: Author.
- Dorman, M.F., Loizou, P.C., Fitzke, J. & Tu, Z. (1998). The recognition of sentences in noise by normal-hearing listeners using simulations of cochlear-implant signal processors with 6-20 channels. *Journal of the Acoustical Society of America*, 104, 3583-3585.
- Dorman, M. F., Loizou, P. C., and Rainey, D. (1997). Speech intelligibility as a function of the number of channels of stimulation for signal processors using sine-wave and noise-band outputs. *Journal of the Acoustical Society of America*, 102, 2403-2411.
- Friesen, L. M. , Shannon, R. V. , Başkent, D. , and Wang, X. (2001). Speech recognition in noise as a function of the number of spectral channels: Comparison of acoustic hearing and cochlear implants, *Journal of the Acoustical Society of America*. 110, 1150–1163
- Fu, Q. J. (2002). “Temporal processing and speech recognition in cochlear implant users,” *Neuroreport*. 13, 1635-1639.
- Healy, E.W., Yoho, S.E., & Apoux, F. (2013). Band importance for sentences and words reexamined. *Journal of the Acoustical Society of America*, 133, 463-473.
- Kreft, H. A., Donaldson, G. S., and Nelson, D. A. (2004). Effects of pulse rate and electrode array design on intensity discrimination in cochlear implant users, *Journal of the Acoustical Society of America*. 116, 2258-2268.
- Loizou, P. (2006). Speech processing in vocoder-centric cochlear implants, *Cochlear and Brainstem Implants* (ed. Moller, A.), Adv. Otorhinolaryngol. Basel, Karger, 64, 109–143.
- Moore, B.C.J. (2007). *Cochlear Hearing Loss*. London: Whurr.
- Rosen, S. (1992). Temporal information in speech: Acoustic, auditory and linguistic aspects. *Philosophical Transactions of the Royal Society of London*, 336, 367-373.
- Shannon, R. V., Zeng, F.-G., Kamath, V., Wygonski, J., and Ekelid, M. (1995). Speech recognition with primarily temporal cues. *Science*, 270, 303-304.
- Shannon, R. V., Zeng, F.-G., and Wygonski, J. (1998). Speech recognition with altered spectral distribution of envelope cues. *Journal of the Acoustical Society of America*, 104, 2467-2476.
- Stickney, G.S., and Assmann, P.F. (2001). Acoustic and linguistic factors in the perception of bandpass-filtered speech. *Journal of the Acoustical Society of America*, 109, 1157-1165.
- ter Keurs, M., Festen, J. M., & Plomp, R. (1992). Effect of spectral envelope smearing on speech reception. I. *Journal of the Acoustical Society of America*, 91, 2872-2880.
- ter Keurs, M., Festen, J. M., & Plomp, R. (1993). Effect of spectral envelope smearing on speech reception. II. *Journal of the Acoustical Society of America*, 93, 1547-1552.
- Turner, C. W., Souza, P. E., and Forget, L. N. (1995). Use of temporal envelope cues in speech recognition by normal and hearing-impaired listeners. *Journal of the Acoustical Society of America*, 97, 2568-2576.
- Van Tasell, D. J., Soli, S. D., Kirby, V. M., and Widin, G. P. (1987). Speech waveform envelope cues for consonant recognition. *Journal of the Acoustical Society of America*, 82, 1152-1161.
- Warren, R. M., and Bashford, J. A., Jr. (1999). Intelligibility of 1/3-octave speech: Greater contribution of frequencies outside than inside the nominal passband, *Journal of the Acoustical Society of America*, 106, L47–L52.
- Warren, R. M., Bashford, J. A., Jr., and Lenz, P. W. (2004). Intelligibility of bandpass filtered speech: Steepness of slopes required to eliminate transition band contributions, *Journal of the Acoustical Society of America*, 115, 1292–1295.
- Warren, R. M., Riener, K. R., Bashford, J. A., Jr., and Brubaker, B. S. (1995). Spectral redundancy: Intelligibility of sentences heard through narrow spectral slits, *Percept. Psychophys.*, 57, 175–182.
- Zeng, F. G. (2002). Temporal pitch in electric hearing. *Hearing Research*. 174, 101-106.

**Academic Misconduct:** No deviations from complete academic honesty will be tolerated.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct at <http://studentlife.osu.edu/csc/>.

**Diversity:** Our department and our university have a long legacy of embracing inclusion, diversity, community, and openness. Our challenge is to ensure that we continue to be proactive in our efforts to nurture and realize these values. Therefore, we will continue to make every effort to welcome students of different backgrounds, cultures, and opinions and work to maintain an environment that is respectful of this diversity. University policies and other resources may be found here: <http://www.studentaffairs.osu.edu/bias/>

## **Students with Disabilities:**

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone [614-292-3307](tel:614-292-3307), [slds@osu.edu](mailto:slds@osu.edu); [slds.osu.edu](http://slds.osu.edu).