

**University of Wisconsin-Madison  
Communication Sciences and Disorders**

**Course: CSD 850 Hearing Science I - Basic Acoustics and Psychoacoustics**

**Term: Fall 2019**

**Number of credits: 3**

This course covers the physical aspects of sound, anatomy and physiology of the auditory system, and basic concepts in psychoacoustics. The course entails two 75-minute class periods each week over the Fall term and carries the expectation that students will work on course learning activities for about 3 hours outside of the classroom for every class period.

**Schedule**

*Time:* Mondays and Wednesdays 9-10:15 AM (see exceptions in class calendar below)

*Location:* Goodnight hall Rm 412

**Instructor**

*Name:* Viji Easwar, PhD, MSc Audiology

*Email:* [veaswar@wisc.edu](mailto:veaswar@wisc.edu) (Please include "CSD 850" in the subject line of emails)

*Office hours:* Mondays 10:30 AM – 11:30 AM or meet by appointment *Office location:* Room 475, Goodnight Hall, 1975 Willow Dr, Madison, WI 53706

**Required texts**

1. Moore, B.C.J. (2012) An Introduction to the Psychology of Hearing. 6<sup>th</sup> Edition. Emerald press: Bingley. ISBN: 9004252428
2. Schnupp, J., Nelken, I., & King, A.J. (2011) Auditory Neuroscience – Making sense of sound. MIT Press: Cambridge. ISBN: 9780262113182

**Course webpage**

Access through <https://canvas.wisc.edu/>

All course materials (syllabus, lectures, assignments) will be available on canvas. It is the student's responsibility to check for updates. Lectures slides will be made available at least 1 hour before class.

**Course Objectives**

Upon successful completion of this course, students will be able to

- Describe physical aspects of sound as it pertains to auditory perception
- Explain the role of the peripheral and central auditory pathway in sound perception
- Explain key psychological concepts in sound processing involved in human communication
- Describe the consequences of hearing loss and the use of prosthesis on perception

**Course content**

This course consists of 5 units in the following order:

- Acoustics (taught by CSD 854 instructor)
- Anatomy and physiology
- Perception
- Hearing loss, prosthesis and plasticity
- Self-study (all topics)

## Course calendar

Readings assigned for each class must be completed before class. Non-text book readings will be posted on canvas a week before class.

Unit	Date	Topic	Readings	Deadlines
	Wed, Sep 4	Review of syllabus and introduction	No readings	
<i>I. Acoustics (CSD 854)</i>	Tue, Sep 10 (1:230 PM)	Taught by Dr. Boothalingam	See CSD 854	
	Thu, Sep 12 (1:230 PM)	Taught by Dr. Boothalingam	See CSD 854	Sign up for presentation date
<i>II. Anatomy &amp; Physiology</i>	Mon, Sep 16	Anatomy & Physiology	Schnupp Ch 2 (p.51-64); Moore Ch 1 (p.23-24)	Q of the day; special accommodations due; Anatomy assignment opens
	Wed, Sep 18	Anatomy & Physiology	Schnupp Ch 2 (p.64-75); Moore Ch 1 (p.24-35)	Q of the day
	Mon, Sep 23	Anatomy & Physiology	Schnupp Ch 2 (p.75-86); Moore Ch 1 (p. 38-55)	Q of the day; presentation topics due
	Wed, Sep 25	Anatomy & Physiology	Schnupp Ch 2 (p.86-92); Pickles 2015 (canvas); Moore Ch 1 (p.51-55)	Q of the day; Anatomy assignment due 28 Sep
	Mon, Sep 30	Anatomy & Physiology		Q of the day
	<b>Wed, Oct 2</b>	<b>Exam I (acoustics not included)</b>		
<b>Fri, Oct 4</b>	<b>Lab tours in Madison, WI</b>			
	Mon, Oct 7	NO CLASS - class tours compensation		
<i>III. Perception</i>	Wed, Oct 9	Auditory thresholds	Moore Ch 2	Q of the day
	Mon, Oct 14	Frequency selectivity	Moore Ch 3 (p.67-89)	Q of the day
	Wed, Oct 16	Masking	Moore Ch 3 (p. 89-131)	Q of the day
	Mon, Oct 21	Loudness perception	Moore Ch 4	Q of the day
	Wed, Oct 23	Spatial/binaural hearing	Schnupp Ch 5; Moore Ch 7	Binaural assignment opens; Q of the day
	Mon, Oct 28	Spatial/binaural hearing	Schnupp Ch 5; Moore Ch 7	Q of the day
	<b>Wed, Oct 30</b>	<b>Exam II (non-cumulative)</b>		
	Mon, Nov 4	Pitch perception	Schnupp Ch 3 Moore Ch 6	Binaural assignment due; Q of the day
	Wed, Nov 6	Auditory scene analysis	Schnupp Ch 6; Moore Ch 8	Q of the day
	Mon, Nov 11	Speech perception	Schnupp Ch 4; Moore Ch 9	Q of the day
<i>IV. Hearing loss, prosthesis, plasticity</i>	Wed, Nov 13	Effects of cochlear hearing loss	Moore pdf, Moore 1996 (canvas)	Q of the day
	Mon, Nov 18	Auditory prosthesis	Schnupp Ch 8; Moore 2003 (canvas)	Q of the day
	Wed, Nov 20	Plasticity	Schnupp Ch 7	Q of the day
	<b>Mon, Nov 25</b>	<b>Exam III (non-cumulative)</b>		
	Wed, Nov 27	NO CLASS - class tours compensation		
<i>V. Self-study (all topics)</i>	Mon, Dec 2	Presentations - Normal aspects		Q of the day
	Wed, Dec 4	Presentations - Hearing loss		Q of the day
	Mon, Dec 9	Presentations - Perception with auditory prosthesis		Q of the day
	Wed, Dec 11	Presentations - Plasticity		Prosem summaries due; Q of the day

## Course grade

Final grade is based on

- Three non-cumulative exams
  - Exam I – 18%
  - Exam II – 18%
  - Exam III – 18%
- Three assignments
  - Question of the day for all classes (except Acoustics) – 6%
  - Anatomy assignment – 15%

- Binaural listening assignment – 10%
- One presentation – 15%
- Pop-quizzes will contribute to extra credit (maximum 5%)

### Grading scale

Percentage	100-92	91.9-90	89.9-88	87.9-82	81.9-80	79.9-78	77.9-72	71.9-70	69.9-68	67.9-60	<60
UW-SP Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
UW-Madison Letter Grade	A	A-B		B	B-C		C	C-D		D	F

### Exams

- Will be closed book and conducted in class, unless otherwise specified
- Non-cumulative
- Format: short answers, multiple choice, fill in the blanks, True/False, matching, labelling
- Questions regarding exams sent after 6 PM the day before the exam may not be answered

### Question of the day

- The goal of this task is to review and assess understanding of covered concepts before moving on to new materials. Upon successful completion of this everyday task, students will gain experience in creating questions and in applying theoretical concepts/knowledge to clinical applications.
- At the end of each class (by midnight on Mondays and Wednesdays), each student must contribute ONE content question (including the answer) and answer ONE of the implications-for-audiologists question to the course question bank via “Assignments” on canvas.
- Content question: must be one of the 3 types: multiple choice, fill in the blanks or short answers and can be based on lectures and/or readings. Tips for writing questions will be provided on canvas in each assignment description.
- Implications-for-audiologists question: Answer ONE of the following three questions
  - Why is it important for an audiologist to understand this topic?
  - How will knowing this information improve an audiologist’s clinical practice?
  - If an audiologist does not understand this topic, what are the probable mistakes that could affect patient management?
  - Keep the answer short (maximum 3 to 4 sentences)
- Content questions and answers will be compiled for every class and made available for review. Questions from these banks may appear in the exam.
- No questions are needed for the Acoustics unit taught by the CSD 854 instructor.

### Anatomy assignment

- The goal of this assignment is to practice identifying the main anatomical features of the auditory system. Upon successful completion of this assignment, students will be able to identify main landmarks of the external, middle and the inner ear.
- Students will be asked to take pictures of external ears, and select a subset of pictures of the middle and inner ear provided, and label all requested parts.
- Assignment details including instructions and grading rubric will be provided in the document “AnatomyAssignment.pdf” uploaded in “files” (folder: AnatomyAssignment)

### **Binaural listening assignment**

- The goal of this assignment is to experience interaural time and level differences independently. Upon successful completion of this assignment, students will be able to differentiate the nature of time and level cues and describe their level/frequency limits.
- Listening exercises that run on Praat will be available in files (folder: BinauralListeningAssignment). Instructions with a template for assignment will be available in the same folder.

### **Presentations (Self-study unit)**

- The goal of student presentations is to improve self-directed learning, assimilation of research findings and presentation skills. Upon successful completion of the presentation, students will be able to evaluate the literature and summarize a focused topic in Hearing Science
- Four class periods are dedicated for presentations. Each class period is assigned one of the four specific themes: normal hearing, hearing loss, prostheses, plasticity. Students have a pick a day for presentation at the beginning of the semester
- Instructions, suggested topics and grading rubric will be provided in the document "Presentations\_Instructions\_Topics" uploaded in "files" (folder: Presentations)

### **Pop-quizzes**

- Up to 2 pop-quizzes could be administered on the reading materials assigned for the class
- Quizzes, if administered, will be held at the beginning of class and will last no longer than 15 mins

### **Lab tours**

- The goal is to increase student awareness about different aspects of hearing/hearing-related research. See the course calendar for the assigned day
- Attendance is mandatory
- Students from Stevens points arrive the previous night for dinner with students on the Madison campus
- On Friday, students will attend the Brains and Bagels seminar at 830 AM at the Waisman center and tour labs until ~430PM
- Thursday night dinner, Friday breakfast and lunch will be provided. Please respond by indicated deadlines for meal choices
- Clinical supervisors are aware of this tour date. However, it is the student's responsibility to talk to their clinical supervisors about compensating for missed clinic hours

### **Requirement for UW-Madison students**

- UW-Madison students are required to attend a minimum of 3 seminars (prosem or Brains and Bagels) during the fall semester
- Each student will be required to write a 300-500 word summary of the seminar attended. The summary should include: research questions asked, methods used, results, and conclusions. Summaries will not contribute to the final grade but submission is required.
- The three summaries have to be compiled in a single pdf document and uploaded on canvas. The deadline is indicated on the course calendar

### **Academic honesty**

It is the responsibility of students to read and understand the UW-Madison Misconduct Guidelines, posted at <https://conduct.students.wisc.edu/>.

Lectures should not be recorded (audio as well as video), unless the student has accommodations and they have obtained permission from the instructor beforehand.

### **Special accommodations**

If students need any special accommodations in the curriculum, instruction or assessments of this course to enable them to fully participate, they have to meet the instructor by the 16<sup>th</sup> of September. Necessary accommodations will be provided for religious observance with prior notice.

**ASHA standards addressed by this course/KASA statements associated with CSD 850**

<b>ASHA reference</b>	<b>Topic</b>	<b>Type of documentation/experience</b>
	<b>3.1.2A FOUNDATIONS OF AUDIOLOGY PRACTICE</b>	
A1	Embryology, anatomy, and physiology of the auditory, vestibular, and related body systems	Assignments and Exams
A2	Normal aspects of auditory and vestibular function across the lifespan	Assignments and Exams
A10	Effects of pathophysiology on the auditory, vestibular, and related body systems	Assignments and Exams
A12	Principles of psychoacoustics as related to auditory perception in individuals with normal hearing and those with hearing loss	Assignments and Exams
A18	Principles and practices of research, including experimental design, evidence-based practice, statistical methods, and application of research to clinical populations	Assignments and Exams
	<b>3.1.3A IDENTIFICATION AND PREVENTION OF HEARING LOSS, TINNITUS, AND VESTIBULAR DISORDERS</b>	