

# University of Wisconsin-Madison

## Communication Sciences and Disorders

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

**Term: Fall 2020**

**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 semester 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 8:15-9:30 AM (see detailed class calendar below)

Location: Canvas > BBCollaborate Ultra > Session “Lecture Room”

### **Instructor**

Name: Ellen Peng, PhD

Email: [z.ellen.peng@wisc.edu](mailto:z.ellen.peng@wisc.edu)

Office hours: Mondays from 9:30-10:30 AM (“Office Hour Chat Room” in BBCU)

Preferred off-line communication:

- “General Course Discussion” forum on Canvas for public, course-specific questions
- Email Ellen for all other questions. Please include “[CSD-850]” in email subject line

### **Required texts**

1. Moore, B.C.J. (2012) An Introduction to the Psychology of Hearing. 6th 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/>

- Online lectures in “Lecture Room” from 8:15-9:30 AM in BBCollaborate Ultra on Canvas
- All course materials (syllabus, lecture slides, assignments) will be available on Canvas. It is the student’s responsibility to check for updates. Lecture slides will be made available 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:

1. Acoustics (taught by CSD 854 instructor)
2. Anatomy and physiology
3. Perception
4. Hearing loss, prosthesis and plasticity
5. Self-study (all topics)

## Course calendar

Readings assigned for each class must be completed before class. Non-textbook readings will be posted on Canvas a week before class.

Unit	Date	Topic	Readings	Deadlines
	Wednesday, September 2, 2020	Review of syllabus & introduction	No readings	
	Monday, September 7, 2020	No Class (Labor Day)		
1. Acoustics (CSD 854)	Wednesday, September 9, 2020	Taught by Dr. Boothalingam (CSD 854)	See CSD 854	
	Monday, September 14, 2020	Taught by Dr. Boothalingam (CSD 854)	See CSD 854	
2. Anatomy & Physiology	Wednesday, September 16, 2020	Anatomy & Physiology	Schnupp Ch 2 (p.51-64); Moore Ch 1 (p.23-24)	Q of the day Special accommodation DUE; Anatomy assignment opens
	Monday, September 21, 2020	Anatomy & Physiology	Schnupp Ch 2 (p.64-75); Moore Ch 1 (p.24-35)	Q of the day
	Wednesday, September 23, 2020	Anatomy & Physiology	Schnupp Ch 2 (p.75-86); Moore Ch 1 (p.38-55)	Q of the day Presentation topics DUE
	Monday, September 28, 2020	Anatomy & Physiology	Schnupp Ch 2 (p.86-92); Moore Ch 1 (p.51-55); Pickles 2015 (Canvas)	Q of the day
	Wednesday, September 30, 2020	Anatomy & Physiology		Q of the day Anatomy assignment DUE 10/2
	Monday, October 5, 2020	<b>Exam 1 (Anatomy &amp; Physiology only)</b>		
3. Perception	Wednesday, October 7, 2020	Auditory thresholds	Morre Ch 2	Q of the day
	Monday, October 12, 2020	Frequency selectivity	Morre Ch 3 (p.67-89)	Q of the day
	Wednesday, October 14, 2020	Masking	Morre Ch 3 (p.89-131)	Q of the day
	Monday, October 19, 2020	Loudness perception	Moore Ch 4	Q of the day
	Wednesday, October 21, 2020	Spatial/binaural hearing	Schnupp Ch 5; Moore Ch 7	Q of the day
	Monday, October 26, 2020	Spatial/binaural hearing	Schnupp Ch 5; Moore Ch 7	Q of the day Binaural assignment opens
	Wednesday, October 28, 2020	<b>Exam 2 (non-cumulative)</b>		
	Monday, November 2, 2020	Pitch perception	Schnupp Ch 3; Moore Ch 6	Q of the day
	Wednesday, November 4, 2020	Auditory scene analysis	Schnupp Ch 4; Moore Ch 8	Q of the day
	Monday, November 9, 2020	Virtual Seminar		Binaural assignment DUE
	Wednesday, November 11, 2020	Speech perception	Schnupp Ch 4; Moore Ch 9	Q of the day
4. Hearing loss, prosthesis, plasticity	Monday, November 16, 2020	Effects of cochlear hearing loss	Moore pdf; Moore 1996 (Canvas)	Q of the day
	Wednesday, November 18, 2020	Auditory prosthesis	Schnupp Ch 8; Moore 2003 (Canvas)	Q of the day
	Monday, November 23, 2020	Plasticity	Schnupp Ch 7	Q of the day
	Wednesday, November 25, 2020	<b>Exam 3 (non-cumulative)</b>		
5. Self-study (all topics)	Monday, November 30, 2020	Presentations - Normal aspects		Q of the day
	Wednesday, December 2, 2020	Presentations - Hearing loss		Q of the day
	Monday, December 7, 2020	Presentations - Perception with auditory prosthesis		Q of the day
	Wednesday, December 9, 2020	Presentations - Plasticity		Q of the day Seminar summaries DUE

## Course grade

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### Exams

Exam 1	18%
Exam 2	18%
Exam 3	18%

### Assignments

Q of the day (except Acoustics)	6%
Anatomy assignment	15%
Binaural listening assignment	10%

### Project

Individual Presentation	15%
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(Extra credit up to 5%)

**Final grade** **100%**

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## Grading scale

%	100-92	91.9-90	89.9-88	87.9-82	81.9-80	79.9-80	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

- On Canvas during lecture time – more details on this later
- Non-cumulative
- Format: short answers, multiple choice, fill in the blanks, True/False, matching, labeling
- Questions regarding exams sent after 5 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 task (every lecture), 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 & Wednesday), 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 three types: multiple choice, fill in the blanks or short answers and can be based on lectures and/or assigned readings. Tips for writing questions will be provided on Canvas in each assignment description
- Implications-for-audiologist question: Answer ONE of the following three questions in 3-4 sentences:
  - 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?
- 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 Unit 1: Acoustics taught by 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 instructions document

### **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 limits in spatial hearing
- Listening exercises will be run on Gorilla.sc. Instructions on the assignment will be available in the instructions document

### **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 to pick a day for presentation at the beginning of the semester
- Instructions, including suggested topics and grading rubric, will be provided in the file "Presentations\_Instructions\_Topics" (folder: Presentations)

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

- UW-Madison students are required to attend a minimum of 3 seminars (prosem or Brains & 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

### **Extra credits**

- Seminars in audiology and/or hearing science (other than prosem and Brains & Bagels). A short summary of 300~500-word summary is required for extra credit. 1-pt extra credit per seminar. A list of online seminars will be provided. If you are attending a seminar that is not listed on the list, check in with instructor first.
- Participation in research studies – more details on this later

**Academic honesty**

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

**Special accommodations**

If students need any special accommodations in the curriculum, instructions 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.

**Other resources**

Module 0|Course Orientation on Canvas include additional resources regarding online learning and UW-Madison policies on COVID-related issues and diversity & inclusions. If a student is affected by COVID-related illness, either him/herself or caring for others, please contact course instructor as soon as possible to arrange for any potential missed lectures and deadlines.

**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>	