

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

Course: CSD 858 Auditory Electrophysiological Measures I
Term: Spring, 2021

CS&D 858 Physiological Assessment in Audiology I (2 credits)

Study of concepts and procedures for physiological assessment of the auditory system, with emphasis on otoacoustic emissions and auditory brainstem responses. Clinical applications and case studies integrate these recordings with behavioral assessment of the auditory system. This course is accompanied by a 1-credit lab component, CSD 859.

Requisites:

Graduate level standing

Meeting Time

Mondays from 3:20-5:00PM on Canvas BBCollaborate

Instructor: Cynthia G. Fowler, Ph.D.

Email: cynthia.fowler@wisc.edu

Office hours: Wednesday 12-1 PM or by appointment

TA: Miranda Adamczak, B.S.

Email: madamczak@wisc.edu

Office Hours/Discussion: Wednesdays 4-5pm, on Canvas BBCollaborate

Required Textbooks:

Katz, J., ed. (2015). Handbook of Clinical Audiology, 7th Edition. Baltimore: Lippincott Williams & Wilkins. (Abbreviated HCA below)

*Burkard, R., Don, M., and Eggermont, J.J. (eds). 2007. Auditory evoked potentials: Basic principles and clinical applications. Wolters Kluwer/Lippincott Williams & Wilkins. Philadelphia, PA.

Robinette and Glatcke (eds). (2007) Otoacoustic Emissions: Clinical Applications, 3rd ed. Thieme Medical Publishers.

Recommended Textbook:

Jacobson, J.T., ed. (1994). Principles and applications in auditory evoked potentials. Boston: Allyn and Bacon. This book is no longer in print, so the chapters we will use are posted. You may be able to pick up a copy cheaply on a discount book website.

Spring, 2020 Preliminary Syllabus

Date	Topic	Readings	Quiz/Exam
1/25	Auditory Evoked	Burkard & Don (2015). Introduction to	

	Potentials: Overview	<p>auditory evoked potentials, Ch. 11 Katz Handbook of Clinical Audiology (HCA)</p> <p>Jewett DL, Romano MN & Williston JS (1970). Human auditory evoked potentials: Possible brainstem components detected on the scalp. Science 167 #3924</p>	
2/1	Auditory anatomy and physiology relative to auditory evoked potentials	<p>Palmer 2007. Ch 10, Anatomy and physiology of the auditory brainstem.</p> <p>Moller 2007. Ch. 16, Neural generators for the auditory brainstem evoked potentials.</p>	
2/8	Recording methods	<p>Durrant & Boston, 2007. Stimuli for auditory evoked potentials.</p> <p>Thornton, 2007. Instrumentation and recording parameters</p> <p>Picton et al., 1983. Aspects of averaging. Seminars in Hearing. 4: 327-341.</p> <p>Rosen & Howell, 1991. An introduction to digital signals and systems. Ch. 14 in Signals and systems for speech and hearing. San Diego: Academic Press, pp.283-302.</p>	
2/15	Quiz 1		Quiz 1
2/22	Electrocochleography (ECochG)	<p>Santarelli & Arslan, 2015. Electrocochleography--Ch. 12 in Katz HCA</p> <p>Schoonhoven, 2007. Responses from the cochlea: Cochlear microphonics, summing potential, and compound action potential.</p> <p>Margolis, et al., 1992. Tympanic electrocochleography: Normal and abnormal patterns of response. Audiology 31: 8-24</p> <p>Ge X, 2002. Transtympanic electrocochleography: 10 year experience. Otology-Neurotology 23: 799-805</p>	
3/1	ABR: Normal Responses, Conductive and cochlear responses	<p>Hood, 2015. ABR: Estimation of hearing sensitivity--Ch14 in Katz HCA</p> <p>Burkard & Don, 2007. The auditory</p>	

		<p>brainstem response</p> <p>Sininger, 1992. Establishing clinical norms for auditory brainstem response. AJA 16-18.</p> <p>Fowler, 1992. Effects of stimulus phase on the normal auditory brainstem response. JSHR 35: 167-174.</p> <p>Fowler & Durrant Ch.10 The effects of peripheral hearing loss on the auditory brainstem response.--Jacobson book</p>	
3/8	Quiz 2 & ABR: Effects of retrocochlear pathology	<p>Musiek et al., 2015. ABR: Differential diagnosis.--Ch 13 in Katz HCA</p> <p>Bauch & Olsen, 1990. Ear and Hearing 11: 463-467.</p> <p>Bauch et al., 1996. ABR Indices: Sensitivity, specificity, and tumor size. AJA 5: 97-104</p> <p>Cueva RA, 2004. Auditory brainstem response vs MRI for the evaluation of asymmetrical sensorineural hearing loss. Laryngoscope, 114: 1686-1692.</p>	Quiz 2
3/15	Spring Break		
3/22	Pediatric Audiology: ABR in screening and diagnostics	<p>Sininger, 2007. The use of auditory brainstem responses in screening for hearing loss and audiometric threshold prediction.</p> <p>Cone-Wesson, 1995. How accurate are bone-conduction ABR tests? Am J. Audiol. 4:14-19</p> <p>Stapells, 1994. Low-frequency hearing & the auditory brainstem response. AJA 3:11-13</p> <p>Chiarenza et al. Sex and ear differences of brainstem acoustic evoked potentials in a sample of normal full-term newborns. Normative Study. EEG & Clin Neurophysiology</p>	
3/29	Otoacoustic Emissions: origins	Prieve & Fitzgerald, 2015. Otoacoustic emissions--Ch. 19 in Katz HCA	

	and bases of recording	R&G Ch 1-5. Brownell, 1990. Outer hair cell motility and otoacoustic emissions. Ear Hear 11:82-92. Kemp, Ryan, & Bray. 1990. A guide to the effective use of otoacoustic emissions, Ear Hear 11: 93-105.	
4/5	Otoacoustic emissions: Normal aspects	R&G Ch. 7-10. Trine, Hirsch, & Margolis, 1993. The effect of middle ear pressure on transient evoked otoacoustic emissions, Ear Hear 14:401-407.	
4/12	Otoacoustic emissions: Hearing loss and suppression	R&G Ch. 14, 15, 6, 13 Glatke et al., 1995. Identification of hearing loss in children and young adults using measures of transient otoacoustic emission reliability, Am J Audiol 4: 71-86. Hood, 2007. Auditory neuropathy and dys-synchrony.	
4/19	Clinical correlation: OAE and ABR data in case studies	R&G Ch. 11, 12 Berlin et al. 1998. Reversing click polarity may uncover auditory neuropathy in infants. Ear Hear. 19: 37-47.	
4/26	Quiz 3 & Clinical correlation		Quiz 3

Grading Breakdown:

3 Exams, 25 points each

Weekly brief quizzes, 25 points in total

Grading Scale:

All grades are awarded based on the percentage score earned. Because UW – Madison and UW – Stevens Point have different grading scales, grades will be assigned based on the home campus of the student using the table below:

UW – SP											
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F

Percentage	100-93	92.9-90	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 – Madison Letter Grade	A	A-B	B	B-C	C	C-D	D	F			

Exam Format

Exams will be administered and graded via Canvas.

The first exam is in class on canvas. You will have the duration of the class to complete the exam. The exam will be open book/notebook, but you will not have time to look up many answers, so advance preparation is strongly advised.

Exams 2 and 3 will be completed outside of class. On the week of an exam, the exam will open for a specified time period that will be defined for each exam. Once you begin the exam, you will have a fixed time to complete the exam and submit it. These exams are open book/notebook. Questions will include applications of the material.

For all exams, discussions among students or other individuals are not permitted until all exams are turned in. Taking the test means that you agree to all of the rules.

Course Learning Outcomes:

Skills expected to be gained by the end of the course

1. Describe the normal anatomy and physiology of the cochlea
2. Describe how the cochlea transduces sounds into electric potentials
3. Describe how to record and interpret ECochGs
4. Discuss how to record an auditory brainstem response and explain why we use each of the parameters
5. Determine how to interpret normal and pathological response
6. Describe how the cochlea creates otoacoustic emissions
7. How to record and interpret otoacoustic emissions
8. How to integrate the information from behavioral and physiological responses to determine the status of the auditory system in a patient.

How Credit Hours are met:

Traditional Carnegie Definition – One hour (i.e. 50 minutes) of classroom or direct faculty/instructor instruction and a minimum of two hours of out of class student work each week over approximately 15 weeks, or an equivalent amount of engagement over a different number of weeks. Out of class time includes study time, assignments, and some exams.

ACADEMIC INTEGRITY (taken from <http://www.wisc.edu/students/UWS14.htm>)

Academic honesty requires that the course work (drafts, reports, examinations, papers) a student presents to an instructor honestly and accurately reflects the student's own academic efforts. UWS 14.03 defines academic misconduct as follows:

"Academic misconduct is an act in which a student
(a) seeks to claim credit for the work or efforts of another without authorization or citation;
(b) uses unauthorized materials or fabricated data in any academic exercise;
(c) forges or falsifies academic documents or records;
(d) intentionally impedes or damages the academic work of others;
(e) engages in conduct aimed at making false representation of a student's academic performance"
(f) assists other students in any of these acts."

Examples include but are not limited to the following: cutting and pasting text from the web without quotation marks or proper citation; paraphrasing from the web without crediting the source; using another person's ideas, words, or research and presenting it as one's own by not properly crediting the originator; stealing examinations or course materials; signing another person's name to an attendance sheet; hiding a book knowing that another student needs it to prepare an assignment; collaboration that is contrary to the stated rules of the course, or tampering with a lab experiment or computer program of another student.

If academic misconduct has occurred, the student may be subject to one or more of the following penalties: an oral or written reprimand, a lower grade or a failing grade in the course, university disciplinary probation, suspension, or expulsion. See additional information regarding academic misconduct at <http://www.wisc.edu/students/UWS14>.

PRIVACY OF STUDENT RECORDS and the USAGE of AUDIO RECORDED LECTURES

Lecture materials and recordings for CSD 858 are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's to [Rules, Rights and Responsibilities](#)

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: “The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.”

<http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

DIVERSITY & INCLUSION

Institutional statement on diversity: “Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.” <https://diversity.wisc.edu/>

Course Accessibility and Accommodations

We wish to fully include persons with disabilities in this course. Please let us know, within the first two weeks of the course, if you need any special accommodations in the curriculum, instruction, or assessments of this course to enable you to fully participate. We will maintain the confidentiality of the information you provide. Online information:

- Access and Accommodations Resource Coordinators
 - <http://www.wisc.edu/adac/facstaff/coord.html>
- Equity and Diversity Resource Center
 - <http://www.wisc.edu/edrc/disability/>
- Facilities Access
 - <http://www.fpm.wisc.edu/accessibility>
- McBurney Disability Resource Center
 - <http://www.mcburney.wisc.edu/>
- Madison ADA Policies
 - <http://www.wisc.edu/adac>

Religious Observances and Personal Emergencies

State law mandates that any student with a conflict between an academic requirement and any religious observance must be given an alternative for meeting the academic requirement. The law also stipulates that students be given a mechanism by which they can conveniently and confidentially notify an instructor of the conflict. A student's claim of a religious conflict, which may include travel time, should be accepted at face value. A great variety of valid claims exist for religious groups, and there is no practical, dignified, and legal means to assess the validity of individual claims.

The following three guidelines that have been developed to provide clarity for both students and instructors: (1) Announce early in the semester that your students must notify you within the first two weeks of class of the specific days or dates on which they request relief. Including this information on your course syllabus is encouraged, to make sure your students are informed of the policy. (2) Make-ups may be scheduled before or after the regularly scheduled requirements. (3) It is understood that instructors may set reasonable limits on the total number of days claimed by any one student. Occasionally, students may not fully understand the necessity for prior notice, and under these circumstances we urge you to be as flexible as possible. Our policy seeks to be sensitive to the needs of individual students.

A listing, though not exhaustive, of religious holidays is available on the website: <http://interfaith-calendar.org/>.

UW-MADISON FACE COVERING GUIDELINES

While on campus all employees and students are required to wear appropriate and properly fitting face coverings while present in any campus building unless working alone in a laboratory or office space.

Face Coverings During In-person Instruction Statement (COVID-19)

Individuals are expected to wear a face covering while inside any university building. Face coverings must be worn correctly (i.e., covering both your mouth and nose) in the building if you are attending class in person. If any student is unable to wear a face-covering, an accommodation may be provided due to disability, medical condition, or other legitimate reason.

Students with disabilities or medical conditions who are unable to wear a face covering should contact the McBurney Disability Resource Center or their Access Consultant if they are already affiliated. Students requesting an accommodation unrelated to disability or medical condition, should contact the Dean of Students Office.

Students who choose not to wear a face covering may not attend in-person classes, unless they are approved for an accommodation or exemption. All other students not wearing a face covering will be asked to put one on or leave the classroom. Students who refuse to wear face coverings appropriately or adhere to other stated requirements will be reported to the Office of Student Conduct and Community Standards and will not be allowed to return to the classroom until they agree to comply with the face covering

policy. An instructor may cancel or suspend a course in-person meeting if a person is in the classroom without an approved face covering in position over their nose and mouth and refuses to immediately comply.

QUARANTINE OR ISOLATION DUE TO COVID-19

Student should continually monitor themselves for COVID-19 symptoms and get tested for the virus if they have symptoms or have been in close contact with someone with COVID-19. Student should reach out to instructors as soon as possible if they become ill or need to isolate or quarantine, in order to make alternate plans for how to proceed with the course. Students are strongly encouraged to communicate with their instructor concerning their illness and the anticipated extent of their absence from the course (either in-person or remote). The instructor will work with the student to provide alternative ways to complete the course work.

COURSE EVALUATIONS

Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

Digital Course Evaluation (AEFIS)

UW-Madison now uses an online course evaluation survey tool, AEFIS. In most instances, you will receive an official email two weeks prior to the end of the semester when your course evaluation is available. You will receive a link to log into the course evaluation with your NetID where you can complete the evaluation and submit it, anonymously. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.